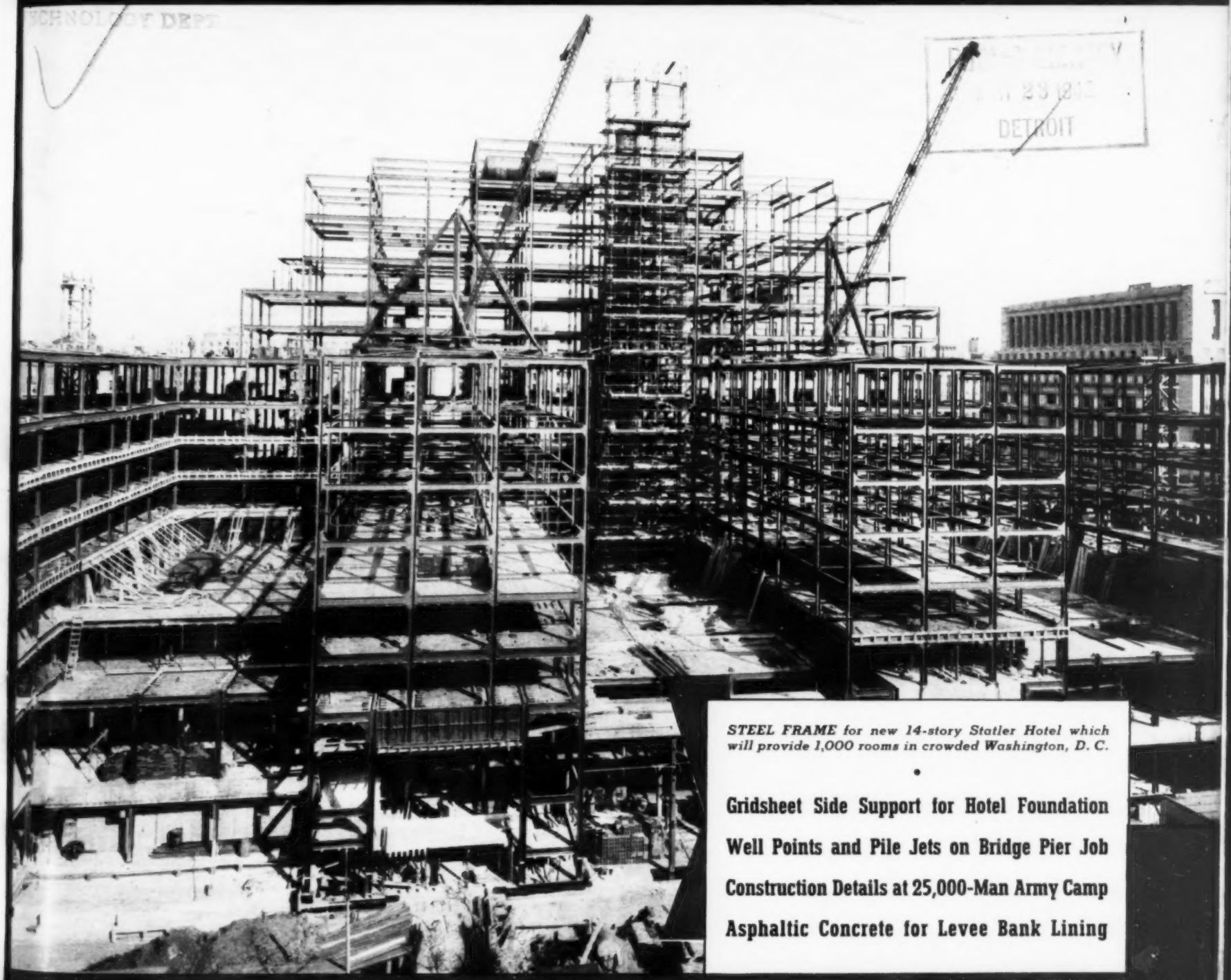
TECHNOLOGY DEPT.

DETROIT

Construction Methods



STEEL FRAME for new 14-story Statler Hotel which will provide 1,000 rooms in crowded Washington, D. C.

•

Gridsheet Side Support for Hotel Foundation

Well Points and Pile Jets on Bridge Pier Job

Construction Details at 25,000-Man Army Camp

Asphaltic Concrete for Levee Bank Lining

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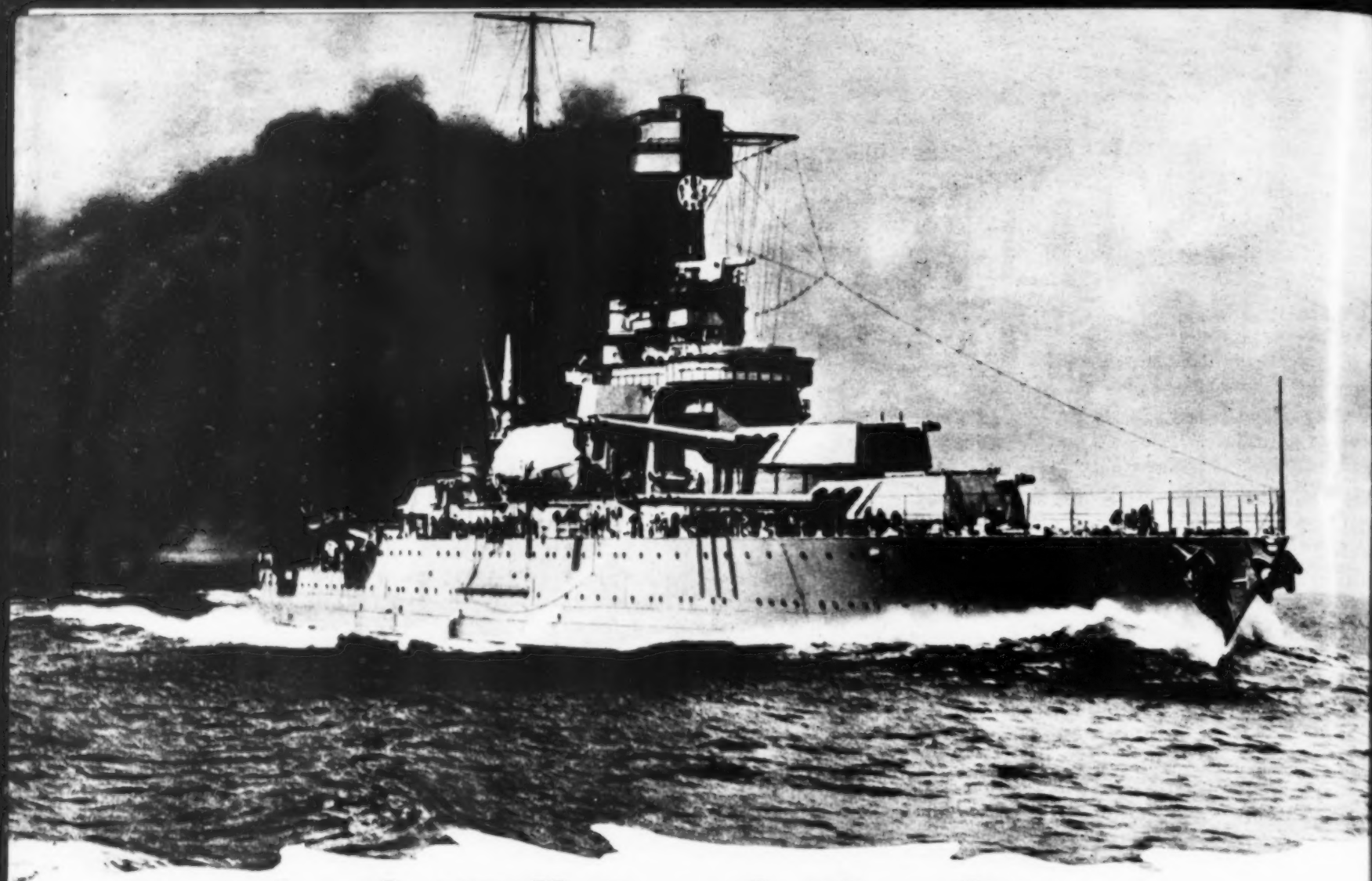

At Inland "Full Speed Ahead" Helps Build Our Two-Ocean Navy

The United States is rapidly building the greatest Navy the world has ever known—a powerful two-ocean Navy to protect our shores and keep the sea lanes open, in the Pacific as well as in the Atlantic.

To the shipyards in which these vessels are being built and to manufacturers throughout the land, who are producing parts and equipment for them, Inland is shipping thousands of tons of steel products. This steel is being used not only for the great "ships of the line" but also for many less spectacular but very essential craft such as submarine chasers, tankers, seaplane tenders, transports, lighters and barges.

At Inland, as in the Navy, it is "full speed ahead." We have broken many production records — we are operating as close to capacity as the available supply of raw materials will permit — and still making the finest steel in our history. And, of course, our mills are being scheduled in strict conformance with priority ratings and allocations.

Every phase of Inland's business now is dominated by our Country's war effort—and we are proud to have it so.

INLAND STEEL

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38 S. Dearborn Street, Chicago • Sales Offices: Milwaukee, Detroit, St. Paul, St. Louis, Kansas City, Cincinnati, New York

CURRENT JOBS

.... and Who's Doing Them

BUILDINGS

Public — An industrial company in Washington has awarded to **H. K. Ferguson Co.**, Cleveland, contract to design and construct a plant to cost $20,000,000. **James Stewart Corp.** and **Fugard, Oleson, Urbain and Neiler** of Springfield will build an industrial plant estimated to cost between $15,000,000 and $20,000,000. **Metcalfe Construction Co., Hamilton Construction Co.**, and **Kansas City Bridge Co.**, all of Kansas City, will build a $25,000,000 industrial plant in Nebraska. Navy Department has contracted with **Morrison-Knudsen Construction Co.**, Boise, Idaho, to build a plant in Idaho, at an estimated cost of $20,000,000. In Illinois **V. Jobst & Sons,** Peoria, has a contract for a $25,000,000 industrial plant. Lowest bidder for an industrial plant in South Dakota to cost $12,458,351 was **J. A. Terteling & Sons,** Boise, Idaho. In Tennessee **O'Driscoll & Grove,** Inc., New York City, have an $8,500,000 contract to build four cantonment sections. **Turner Construction Co.** will build an industrial company operated manufacturing building in Pennsylvania for the Navy Dept., estimated to cost $8,000,000. Low bid for cantonment buildings in Wisconsin was offered by **C. F. Haglin & Sons, Inc.**, and **Winston Bros., Inc.**, Minneapolis. Colorado is the location of a depot to cost $6,120,760, contract for which was awarded to **Midwest Construction Co.**, Chicago. A brick and steel plant in Massachusetts estimated to cost $5,000,000 is to be built by Morton C. Tuttle Co., Boston. **Defense Plant Corp.** will finance for use of an industrial company nine plant buildings to cost more than $5,000,000, contracts going to **J. L. Stuart, Mellon-Stuart Co.** and **Bethlehem Steel Co.**, all of Pittsburgh. Contract for a $5,000,000 industrial plant has been awarded to **H. K. Ferguson Co., Cleveland,** and **Oman Construction Co.**, Nashville, Tenn. Four warehouses in Ohio are to be built by **Corbetta Construction Co.**, New York City, at a cost of $1,000,000 to $5,000,000. A $5,000,000 industrial plant will be built in Texas by **McKenzie Construction Co.** of San Antonio for the War Department.

HEAVY CONSTRUCTION

A $1,000,000-$5,000,000 clearing, grading and drainage contract in Pennsylvania went to **Frank Mashuda** of Milwaukee, Wis., and **Ralph Meyers Construction Co.**, Salem, Ind. In New York improvements estimated at $4,000,000 are to be made by **D. Nassif,** Springfield, Mass., **Geo. M. Brewster & Son, Inc.**, Bogota, N. J., and **Mt. Vernon Contracting Corp.**, Mt. Vernon, N. Y. Navy Department has ordered $4,700,000 of improvements in Indiana, awarding contracts to **J. L. Simmons Co., Inc.**, Decatur, Ill., and **United Construction Co.**, Winona, Minn. High power lines from Dress and Edwardsport, Ind., to Louisville, Ky., and a substation at Bedford, Ind., are to be built by **L. E. Meyers Co.**, Chicago, for the Public Service Co., Terra Haute, at a cost of $3,000,000. **Daniel Construction Co.**, Greenville, S. C., has a $6,500,000 contract from the U. S. Maritime Commission for a series of industrial company improvements. A Government floating drydock to cost $2,000,000 will be built in New Jersey by **Harris Structural Steel Co.**, New York City. **Phillips Petroleum Co.**, Tulsa, Okla., is building 297 mi. of pipe line in Texas, having awarded the $780,000 contract to **Dempsey Construction Co.** of Tulsa. Contract for relocation of a railroad line for Denison dam in Texas at cost of $2,264,440 was awarded to **J. Briscoe of Stillwater, Okla.** In a U. S. possession the government is spending $17,000,000 for improvements to be completed by **Treadwell Construction Co.**, Midland, Pa. **Dunbar & Sullivan Dredging Co.**, Detroit, will remove ledge rock and other material from the Delaware River, near Pennsville, Salem County, New Jersey, to make room for 5,200-ft. timber training dike, contract totalling $2,668,778.

HIGHWAYS AND BRIDGES

Recent highway contract awards: Alabama, $309,387 and $203,585 to **Vandigriff Construction Co.**, Montgomery; California: $655,784 to **Clyde W. Wood,** Los Angeles; Florida: 91-mi. highway, including four bridges, $882,743 to **Cleary Bros. Construction Co.**, West Palm Beach; Ohio: $277,624 to **W. M. Brode Co.**, Newcomerstown; Texas: $490,000 to **Glassell-Taylor Co.** and **Robinson & Young,** Shreveport, La.; $320,000 to **McKinney Construction Co.**, Marshall; $697,000 to **Brown & Root** and **W. S. Bellows,** Houston; Virginia: $674,962 to **Perkins-Barnes Construction Co.**, Blackstone; $624,086 to **T. E. Ritter Co., Inc.**, Norfolk; $276,390 to **W. E. Graham & Sons,** Chatham; $786,100 to **Virginia Paving Co.**, Arlington; Wisconsin: $323,678 and $361,800 to **Thornton Construction Co.**, Hancock, Mich.; $1,075,000 and $350,000 to **J. Rasmussen & Sons,** Oshkosh. Low biddder for contract to build steel, concrete cloverleaf bridge at Baltimore was **C. J. Langenfelder & Sons,** Rosedale, Md.

MAY, 1942

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330 West 42nd St., New York

Construction Methods

A Pictorial Survey of Current Practice, Equipment and Materials

JOHN ABBINK, Publisher
ROBERT K. TOMLIN, Editor — A. E. PAXTON, Manager
Editorial Staff: Vincent B. Smith, Paul Wooton (Washington)
N. A. Bowers (San Francisco) Nelle Fitzgerald

A McGRAW-HILL PUBLICATION

The HOW of it

For the benefit of readers concerned with the practical application of method or equipment the following references are to articles or illustrations in this issue that tell:

How **PRE-CUTTING OF LUMBER** and fabrication of wall panels in horizontal position speeded erection of camp buildings —p. 39
How **WELDED STEEL BRACING SYSTEM** of H-piles, wales and shores, with wood lagging, retained sides of foundation excavation. —p. 42
How **PILEDRIVER** put down vertical H-beams for bank support at edge of excavation. —p. 44
How **CIRCULAR CONCRETE RESERVOIRS** were prestressed by tightening turnbuckles on circumferential steel rods around walls. —p. 45
How **DOME ROOF** of prestressed concrete reservoir was constructed on forms supported by falsework. —p. 45
How **WELL POINTS** drained bottom land near river to permit dry construction of bridge piers. —p. 46
How **COMBINATION AIR-AND-WATER JETS** aided driving of piles for bridge piers. —p. 47
How **STEAM HAMMER** with exhaust hose attached drove piles under water. —p. 48
How **MONOLITHIC BRICK PAVEMENT** was vibrated and grouted on plastic concrete base. —p. 50
How **VIBRATING MACHINE** embedded monolithic brick wearing course in plastic concrete base. —p. 51
How **APPRENTICE WELDERS** received instructions through telephone receivers in helmets while operating electric arcs. —p. 52
How **HOT ASPHALT MIX** for levee paving was placed by dragline. —p. 54
How **CONCRETE WIDENING STRIP** at edge of pavement was struck off by special finisher. —p. 55
How **LIGHTWEIGHT 4-IN. PIPE** weighing only 3 lb. per ft. served construction uses. —p. 56
How **BEEHIVE MAGAZINE** for munitions storage was designed to save steel and construction labor. —p. 56
How **SWIVEL CASTERS** saved scaffold stirrups from abrasive wear. —p. 57
How **TWO LOCOMOTIVE CRANES** raised truss and post assembly for timber-frame building. —p. 61
How **USE OF TIMBER CONNECTORS** reduced size of timbers required for trussed posts. —p. 61
How **PLYWOOD GUSSETS** stiffened transverse frames of Army buildings. —p. 62
How **CONTINUOUS FOUNDATION WALLS** improved stability and appearance of camp buildings. —p. 63
How **POWER-DRIVEN AUGER** dug holes for poles. —p. 64
How **RAFTER ASSEMBLIES** were prefabricated with rafter seats in place. —p. 65
How **PIPE-CARRYING PLATFORM** on tractor delivered pipe in mountain country for welded oil line. —p. 68

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THE JOB JESTER

CARTOONS DRAWN FOR CONSTRUCTION METHODS

"Now there's no hurry about this job boys, just so you have it finished in the next ten days."

"Swanson does all right on the job, but he doesn't mix *well with* people."

"I gotta' lay off of milk . . . turns to butter."

TOP-SPEED CONCRETING

—50% LESS FORMS

1927-1942 . . . 15 YEARS' OUTSTANDING 'INCOR' PERFORMANCE

Use 'Incor'. . . strip forms in 24 hours . . . re-use forms 3 days sooner . . . top speed, 50% less forms. Heavy-duty floors, loading platforms, machinery bases, paving—poured today, ready for use tomorrow. Fast 'Incor' schedules mean better use of every man-hour . . . maximum construction efficiency. *Time won't wait . . . use 'Incor'!*

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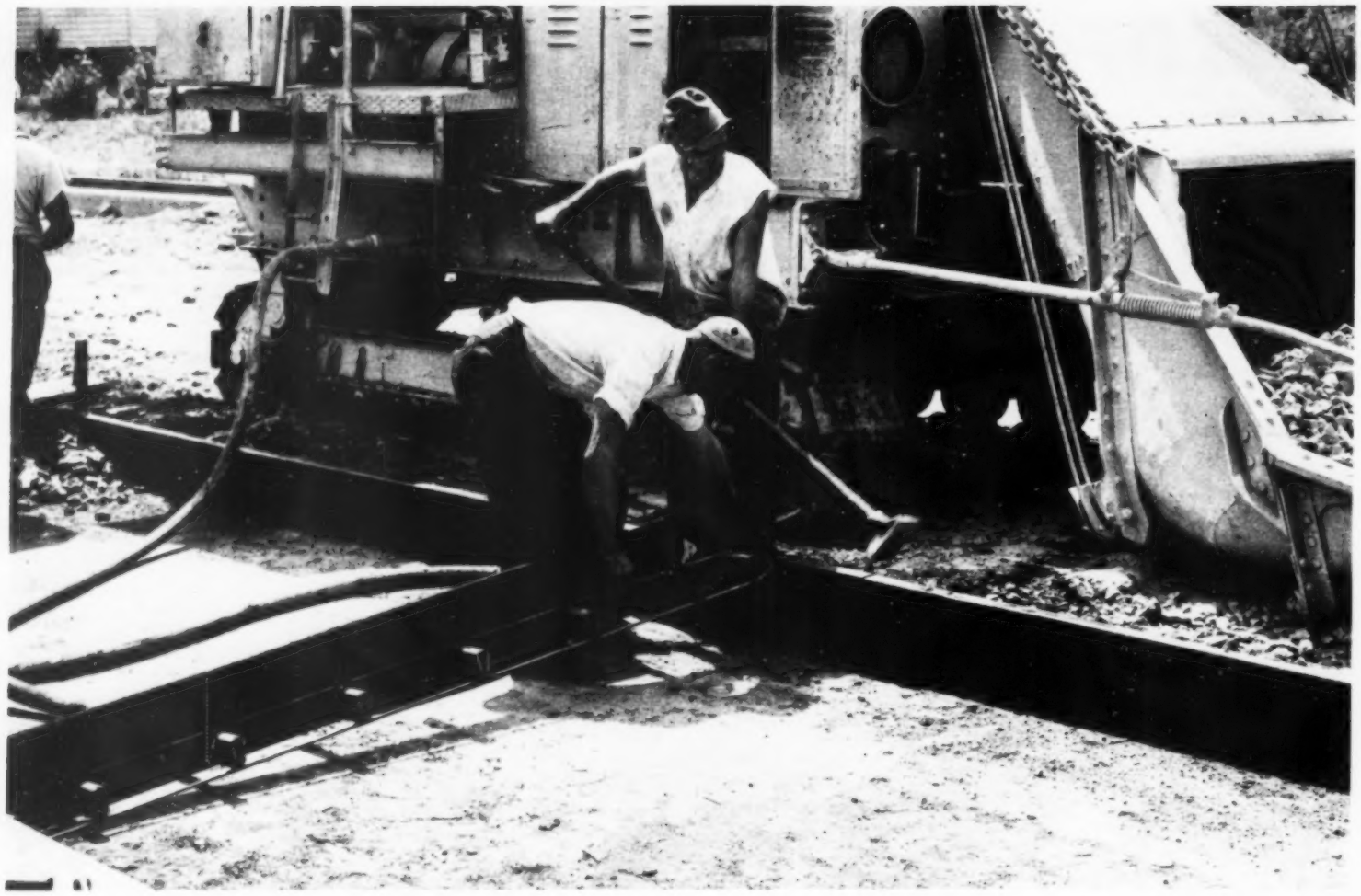


How Bethlehem Road Joints *speed up placing*

Bethlehem Road Joints are especially made to save time in placing. They come all in one piece—completely shop-fabricated. Instead of having to take the time to fit a number of parts together into each unit, and then adjust them, you place the one-piece Bethlehem Joint in almost no time at all.

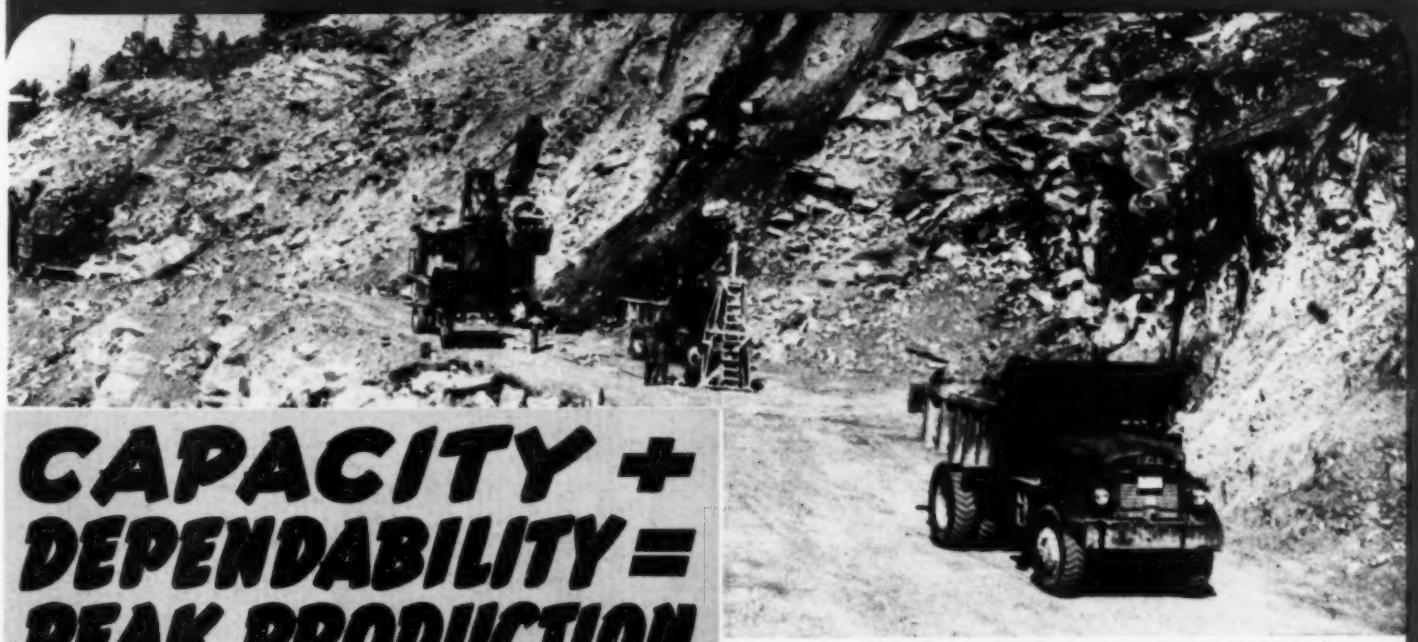
No adjusting is needed on Bethlehem Joints. Dowels are shop-welded to steel spacing bars, parallel and accurately spaced. A third bar welded to the tops of the dowels stabilizes each unit and keeps the dowels firmly and accurately in place. Dowel caps are already in position. And the fiber filler can be quickly fitted into position by one man.

You gain other advantages, too, by using these quick-to-place joints. One or two men can place the unit and anchor it firmly with pins easily driven through the dowels. Also, Bethlehem Joints have such a sturdy, two-sided base that they will not tip over when concrete is dumped against them or when the finishing machine passes over them. And the shape of the unit allows full freedom in working the concrete and in finishing it, so that honeycombs and other common weaknesses in slab structure are completely avoided.

Ask the nearest Bethlehem district office for more facts about these remarkable one-piece road joints that can definitely speed up your paving operations.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY



CAPACITY + DEPENDABILITY = PEAK PRODUCTION

● Capacity alone doesn't assure the peak performance that is so vitally needed today. Without day in and day out dependability of every piece of equipment, unnecessary delays and curtailed production may result.

Euclid Self-Powered Equipment has proved its superior performance and dependability on hundreds of the toughest jobs . . . it's doing its part in setting new production records for both old and new owners on mining and quarrying operations . . . construction of military roads, airports, naval bases, hydro-electric projects . . . and in many industries where earth, ore, rock and other essential materials must be hauled speedily and efficiently.

If we're not able to supply you with Euclid equipment now, please remember that we must first serve those whose use of new Euclids is regarded by our government to be most essential to the nation's welfare. In the meantime Euclid distributors in centrally located cities and our factory parts depots in Cleveland, Memphis, Hibbing, and San Francisco are ready to supply replacement parts that will enable you to keep your present Euclids operating at peak production.

The EUCLID ROAD MACHINERY Co.
CLEVELAND, OHIO

HEAVY-DUTY Electric Drills with wood augers speed up the fabrication of roof trusses — one of dozens of construction uses for Black & Decker Drills.

POWERFUL Black & Decker Electric Hammers make quick work of breaking through paving to install manholes for service lines.

5 Ways Black & Decker *Tools* Help You Beat Schedules!

ROOF TRUSSES are quickly and accurately notched with Black & Decker one-hand QUICK-SAW at a large Army camp.

ELECTRIC NUT RUNNER fastens flange plate on heavy timber construction — speeds up similar assembly operations in steel and lumber.

1 They save *time* because Black & Decker Tools can be bought "on the job" from leading distributors in all principal cities.

2 They save *time* because Black & Decker Tools are easy to use—new men "take" to them quickly and easily.

3 They save *time* because Black & Decker makes the right size and capacity tool for every job—no need to "nurse" a weak tool or "wrestle" a monster.

4 They save *time* because Black & Decker Tools "stay on the job." Their quality insures more production — less breakdowns.

5 They save *time* because one of the Black & Decker 26 Factory-owned Service Branches is near your job to give you immediate "factory service" when repairs are necessary. The Black & Decker Mfg. Co., 759 Penna. Ave., Towson, Md.

HUSKY ELECTRIC HAMMER cuts opening through concrete wall — also drills and channels in stone or brick, vibrates concrete, removes form marks — faster, better and at lower cost than slow hand-hammering.

PROMPT TOOL REPAIRS are obtainable from Black & Decker's nation-wide chain of 26 Factory-owned Service Branches, to minimize "time-out" for repairs, give efficient service.

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FIRST VICE-PRE[illegible]NT

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Gonguay!

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JOHN GRONLUND=HOTEL CHISCA MFS=

RETEL R-B FINEGRADER WORKING TEN HOURS A DAY SEVEN DAYS A WEEK. IT OPERATES AHEAD OF ONE 34E SINGLE AND ONE 34E DUAL DRUM PAVER PAVING 350 FEET PER HOUR=

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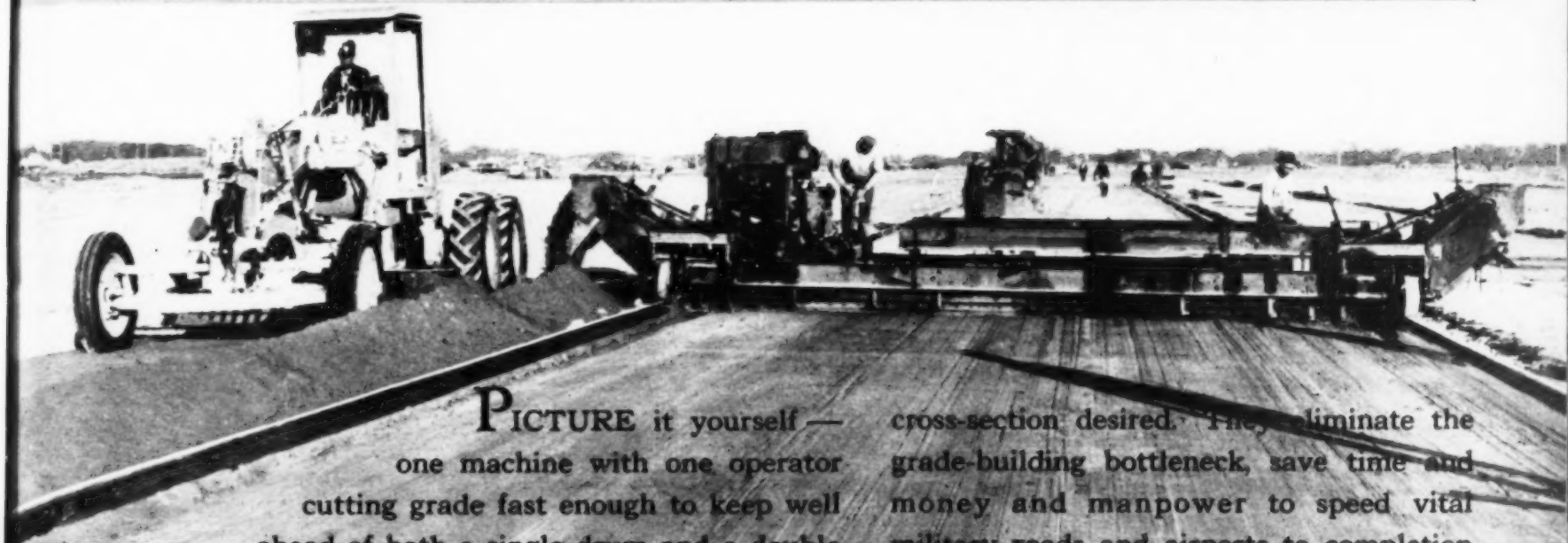
R-B POWER FINEGRADER

here comes AN R-B FINEGRADER!



PICTURE it yourself — one machine with one operator cutting grade fast enough to keep well ahead of both a single drum and a double drum 34-E paver putting down 350 feet of concrete per hour. That's really rolling and that's the reason so many of the nation's leading contractors use Buckeye R-B Power Finegraders. These machines cut the grade right on the nose — to the exact cross-section desired. They eliminate the grade-building bottleneck, save time and money and manpower to speed vital military roads and airports to completion ahead of schedule. They're virtually an essential on today's forced draft projects. Put an R-B Finegrader to work on your next road or airport job and you'll never try to get along without one again.

Write for New Bulletin.

THE BUCKEYE TRACTION DITCHER COMPANY, Findlay, Ohio

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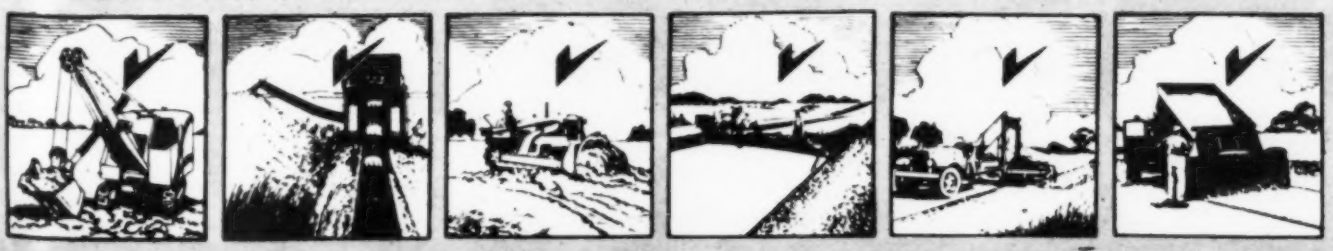
CONVERTIBLE SHOVELS, TRENCHERS AND BACKFILLERS, TRACTOR EQUIPMENT, R-B FINEGRADERS, ROAD WIDENERS AND SPREADERS



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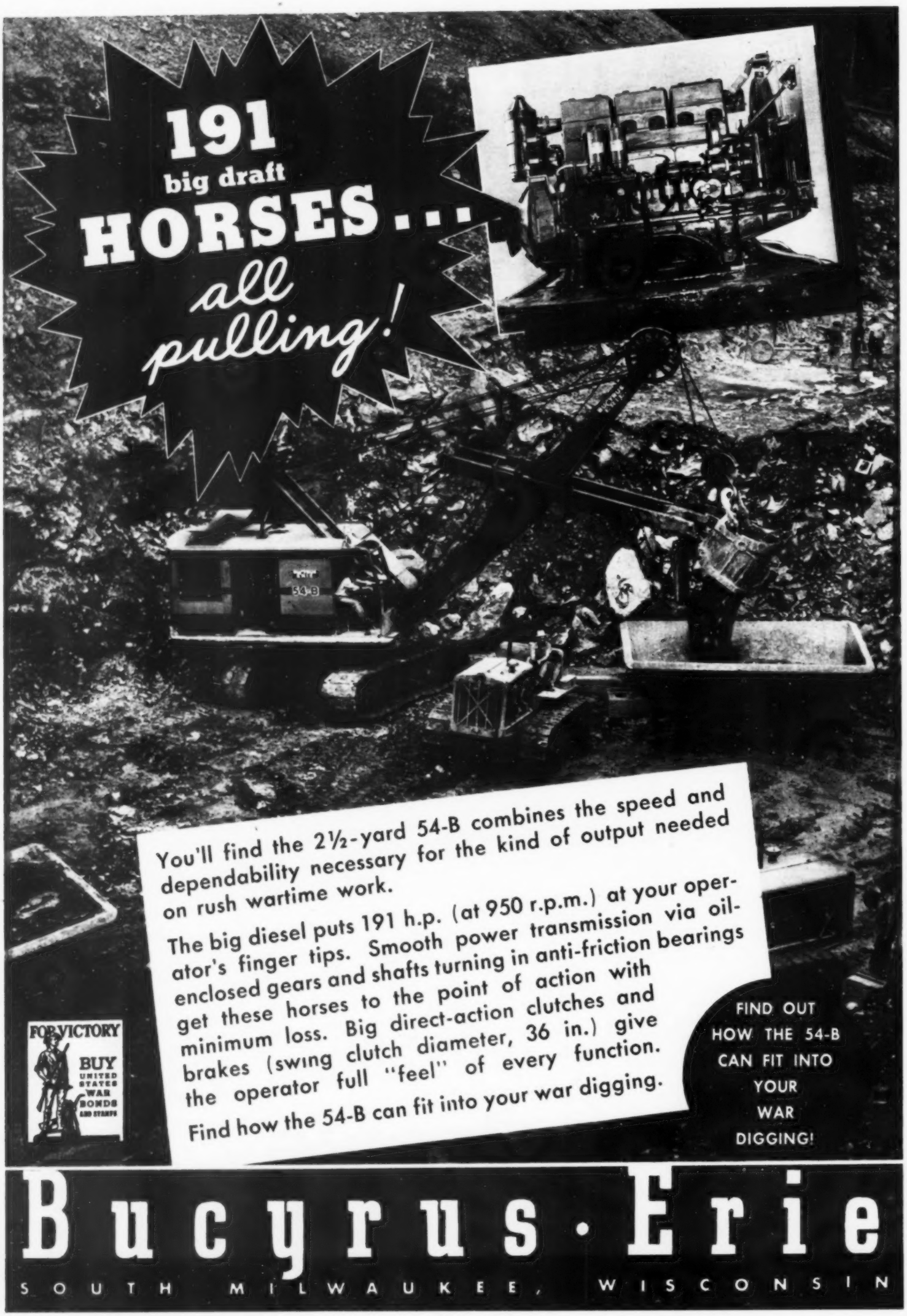
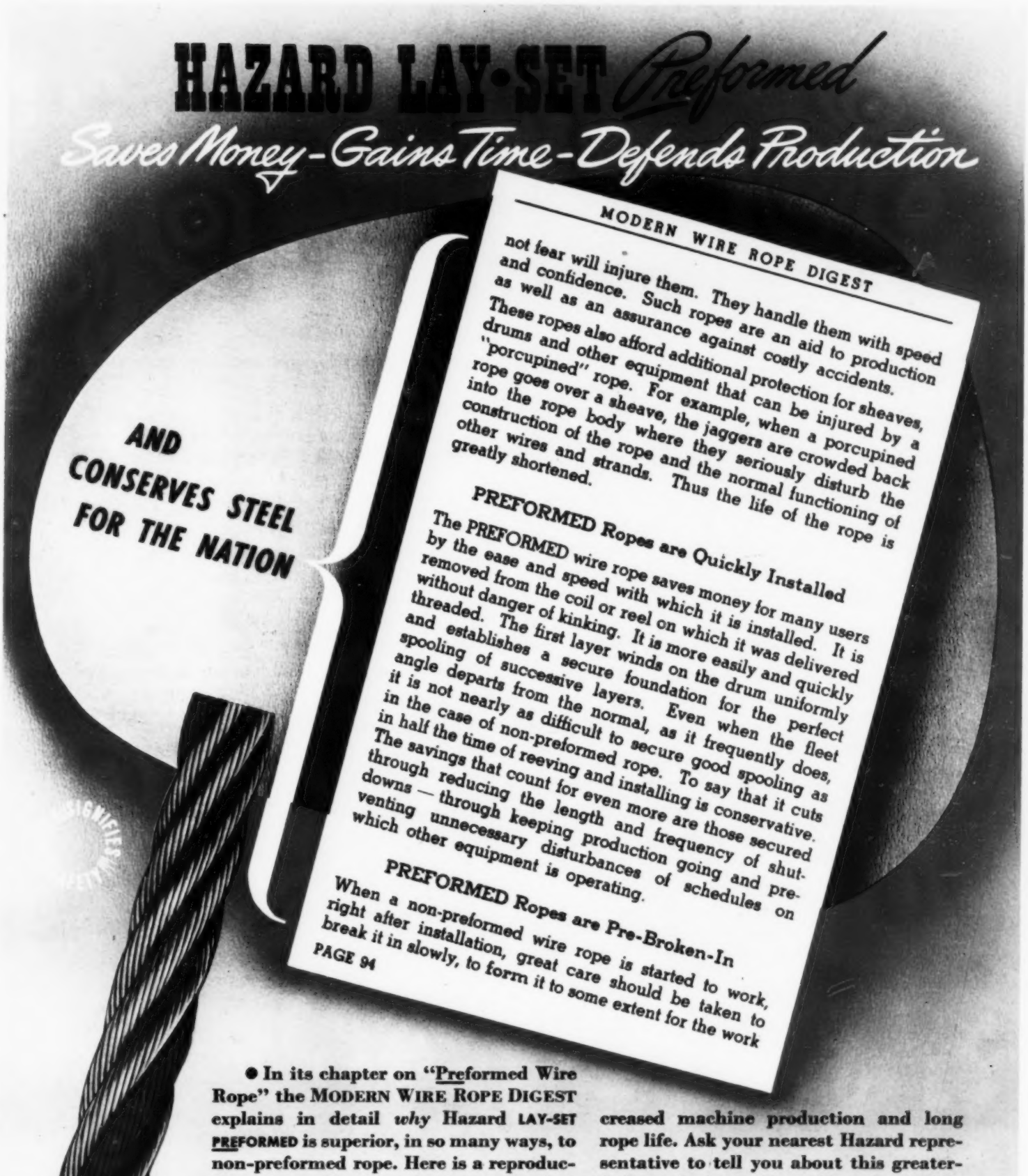

191
big draft
HORSES...
all pulling!
54-B
You'll find the 2½-yard 54-B combines the speed and dependability necessary for the kind of output needed on rush wartime work.
The big diesel puts 191 h.p. (at 950 r.p.m.) at your operator's finger tips. Smooth power transmission via oil-enclosed gears and shafts turning in anti-friction bearings get these horses to the point of action with minimum loss. Big direct-action clutches and brakes (swing clutch diameter, 36 in.) give the operator full "feel" of every function.
Find how the 54-B can fit into your war digging.
FOR VICTORY
BUY
UNITED STATES WAR BONDS AND STAMPS
FIND OUT HOW THE 54-B CAN FIT INTO YOUR WAR DIGGING!
Bucyrus·Erie
SOUTH MILWAUKEE, WISCONSIN

HAZARD LAY-SET *Preformed*

Saves Money - Gains Time - Defends Production

AND CONSERVES STEEL FOR THE NATION


MODERN WIRE ROPE DIGEST
not fear will injure them. They handle them with speed and confidence. Such ropes are an aid to production as well as an assurance against costly accidents.
These ropes also afford additional protection for sheaves, drums and other equipment that can be injured by a "porcupined" rope. For example, when a porcupined rope goes over a sheave, the jaggers are crowded back into the rope body where they seriously disturb the construction of the rope and the normal functioning of other wires and strands. Thus the life of the rope is greatly shortened.
PREFORMED Ropes are Quickly Installed
The PREFORMED wire rope saves money for many users by the ease and speed with which it is installed. It is removed from the coil or reel on which it was delivered without danger of kinking. It is more easily and quickly threaded. The first layer winds on the drum uniformly and establishes a secure foundation for the perfect spooling of successive layers. Even when the fleet angle departs from the normal, as it frequently does, it is not nearly as difficult to secure good spooling as in the case of non-preformed rope. To say that it cuts in half the time of reeving and installing is conservative. The savings that count for even more are those secured through reducing the length and frequency of shut-downs — through keeping production going and pre-venting unnecessary disturbances of schedules on which other equipment is operating.
PREFORMED Ropes are Pre-Broken-In
When a non-preformed wire rope is started to work, right after installation, great care should be taken to break it in slowly, to form it to some extent for the work
PAGE 94

● **In its chapter on "Preformed Wire Rope" the MODERN WIRE ROPE DIGEST explains in detail *why* Hazard LAY-SET PREFORMED is superior, in so many ways, to non-preformed rope. Here is a reproduction of page 94 of that book—a page that covers, at least inferentially, the points of safety, faster and easier handling, increased machine production and long rope life. Ask your nearest Hazard representative to tell you about this greater-dollar-value rope. Every Hazard man has inherited 96 years of wire rope-making experience. He is qualified to help you.**

HAZARD WIRE ROPE DIVISION

Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Fort Worth, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Tacoma

AMERICAN CHAIN & CABLE COMPANY, Inc.

BRIDGEPORT, CONN.

HAZARD LAY-SET *Preformed* WIRE ROPE

The Whiteman to Better

Now you can multiply the capacity of your concrete laying crews by mechanizing each step. You save time—overcome labor shortages—produce better concrete—cut costs.

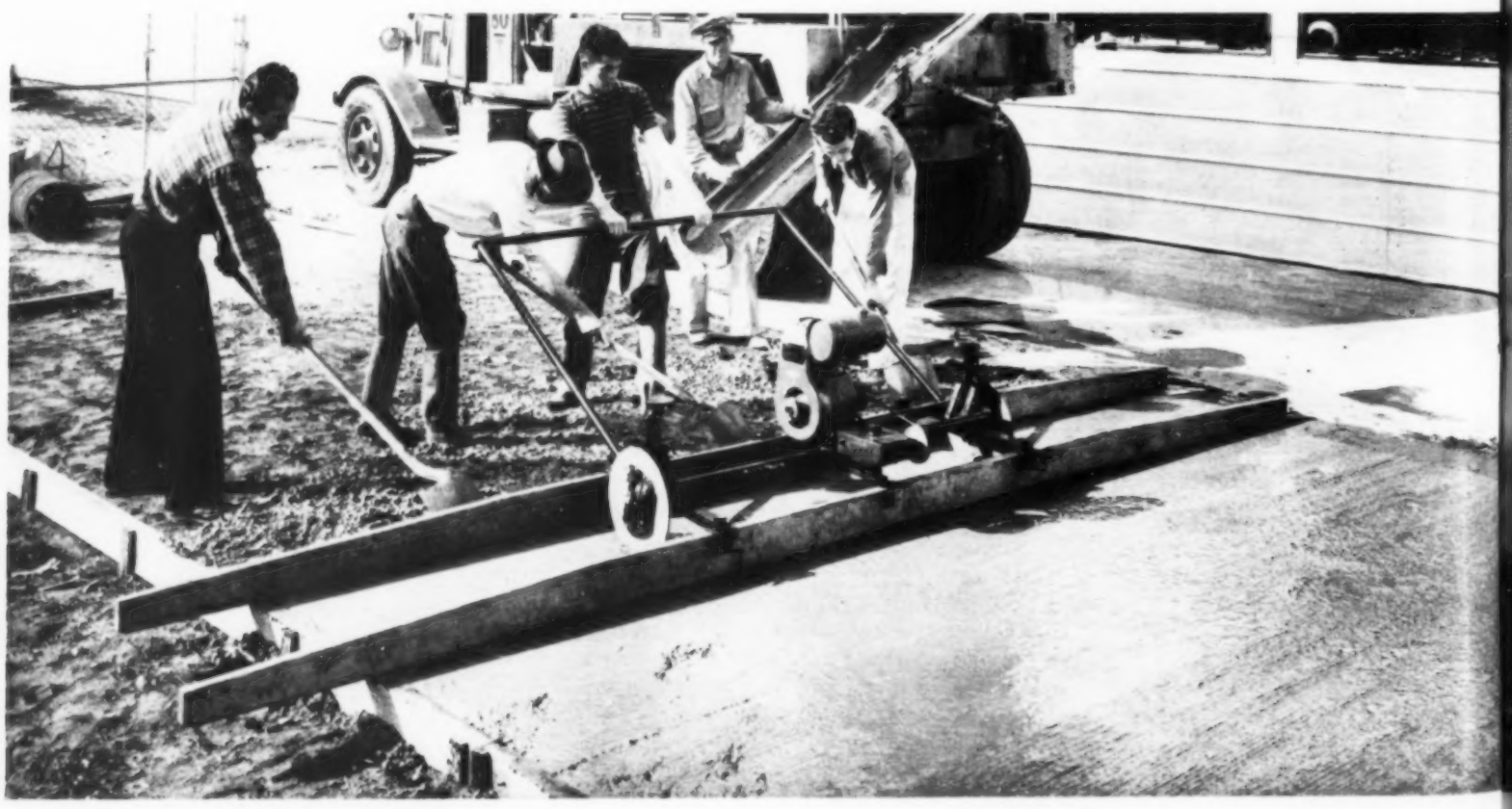
Equipment needed is not expensive, pays for itself on the job—and is available for delivery.

Here's the Whiteman mechanized 3-STEP way to handle concrete slab placement and finishing.

1 SCREEDING

The Whiteman power operated Rodding Machine simultaneously levels and condenses the concrete *while operated by one man*. Experienced contractor-users report 4 cu. yd. of low-slump concrete can be handled in 5 minutes.

The two rod sticks (screeds) of the Whiteman machine ride the headers. Driven by the gasoline engine, the rod sticks make 5-inch transverse strokes—in opposite directions. During the power driven transverse movement, a steady pull forward by the operator provides a uniform rate of advance. This leaves a pour that has been compacted and levelled—ready, when sufficiently set, for Step 2.



3-STEP Method Concrete FLOORS

Mechanizes ❶ Screeding ❷ Floating ❸ Finishing of Concrete Slabs

❷ FLOATING

When you are ready to float the slab, attach the "Heavi-Duti" FLOAT TROWELS (10"x18", ⅛" steel) to your Whiteman Finishing Machine. As your machine moves over the pour it produces a perfect float finish at high speed with the strong, broad trowels, which rotate while lying flat on the concrete surface. Whiteman finishers, float-trowel equipped, will cover 1,000 sq. ft. in as little as 15 minutes. When the "floated" slab has set sufficiently it is ready for Step 3.

FINISHING ❸

Ready to finish? Put the easily attached "FINISH" TROWELS on your Whiteman machine. These lighter, flexible and adjustable blades (6"x18", 17-gage steel) bring up the surface in a hurry, leaving a finish far superior to hand work. Whiteman Finish Trowels give you a harder, denser surface, free of voids or laitance that costs less to finish, and wears longer.

Remember, too, only One Machine – the Whiteman Precision Finishing Machine – with two interchangeable sets of trowels, will do both floating and finishing jobs. You don't have to double your machine investment; you do double the work capacity.

The 3-STEP way places and finshes concrete faster – assures smoother longer life surfaces. For the name of your nearest dealer write us TODAY.

WHITEMAN MANUFACTURING CO.

Department M-5

3249 Casitas Ave. Los Angeles, California

ANOTHER *Speed Record*

150 "IGLOOS" BUILT IN 14 DAYS

SPECIFYING Pozzolith Concrete because of its advantages of greater speed and increased workability, Architect-Engineer Gieb-La Roche and Dahl-Chappell share top honors with Brown and Root, Inc., General Contractors, who built 150 ammunition storage "igloos" in 14 days!

The remarkable advantages of Pozzolith Concrete — concrete in which cement efficiency has been greatly increased through Cement Dispersion — are convincingly illustrated in the following tests made on this job.

	PLAIN* Concrete 2 ½" slump	POZZOLITH* Concrete 4½" slump
7 Day Strength....	1693 lbs.	2583 lbs.
28 Day Strength....	3005 lbs.	4114 lbs.

*Five bags of cement per cubic yard were used in both plain and Pozzolith concrete. Strengths shown are average of 260 plain job-test specimens and 300 Pozzolith job-test specimens.

Here is conclusive proof of the ability of Cement Dispersion to greatly step up construction speed.

Regardless of your concrete requirements — speed, strength, workability, placeability, watertightness, or durability — it will pay you to investigate the advantages of Pozzolith.

Write or wire for Complete Information and Prices.

THE MASTER BUILDERS COMPANY

CLEVELAND, OHIO • TORONTO, ONTARIO

MASTERBUILT PRODUCTS

MASTER

MADE WITH . . .

POZZOLITH CONCRETE *utilizing* CEMENT DISPERSION

"SPEED CONSTRUCTION WITH POZZOLITH"... said the architect-engineer when deciding specifications for 150 bomb and shell storage "Igloos". In the record time of 14 days these were built "somewhere in the Pacific".

HOW CEMENT DISPERSION WORKS

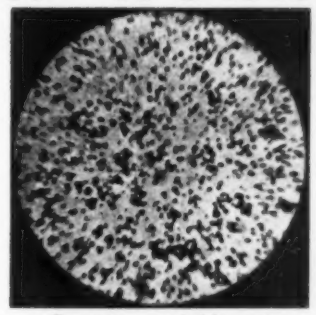
Cement suspended in water
UNDISPERSED

WITHOUT POZZOLITH

In a normal concrete mix, cement particles tend to bunch together, thereby (1) limiting hydration and (2) trapping water within the cement clumps. (See photomicrograph above).

Only a part of the cementitious value of the cement, whether normal portland or high early, is utilized under usual construction conditions. Investigation shows that with 28 days curing only 50% hydrates. [Anderegg and Hubbell, A. S. T. M. 29 II 554 (1929)].

Dispersed cement produces 25% to 40% higher compressive strengths.



Cement suspended in water
DISPERSED

WITH POZZOLITH

Cement Dispersion drives these particles apart and (1) exposes their entire surface area to hydration, at the same time (2) making the water entrapped in the clumps available for lubrication of the mix. (See photomicrograph above).

BUILDERS

MASTERBUILT PRODUCTS

3/8 TO 3 YARD CAPACITY

LINK-BELT SPEEDER

SHOVELS – DRAGLINES
CRANES

Vital to victory are streamlined, modern highways which reach into every part of the country and link industry with every military concentration point and seaport.

The United States has today a great system of highways; yet it is not quite conditioned in all its parts for the giant task ahead.

Our Nation's contractors are working at top-speed, breaking all time-records, building new access roads to military camps and war-industry sites — reconstructing inadequate roads, building new shoulders and bridges.

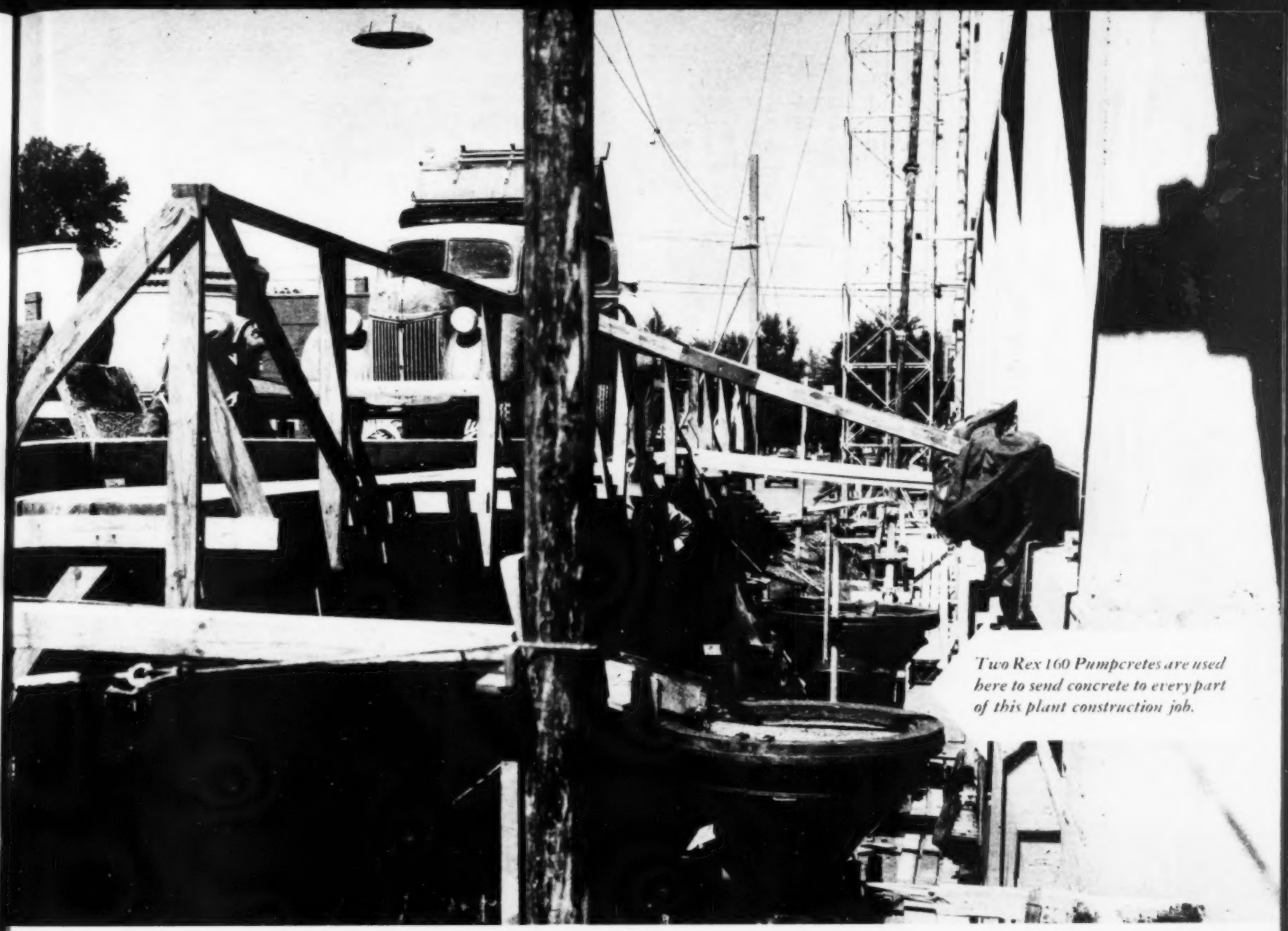
To help the Nation's contractors work better and faster—save that precious time — Link-Belt Speeder, too, is working at top-speed turning out more shovels, draglines and cranes than ever before in its history.

8822

LINK-BELT SPEEDER CORPORATION

Builders of the Most Complete Line of Shovels and Cranes

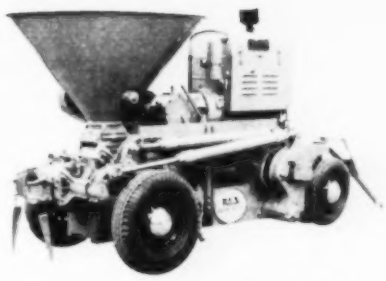
301 WEST PERSHING ROAD • CHICAGO, ILLINOIS



Two Rex 160 Pumpcretes are used here to send concrete to every part of this plant construction job.

CONCRETE GOING UP... Man-Hour Costs Going Down!

Want to cut down man-hour costs on your concrete job? That's what the Rex Pumpcrete and pipe line can do for you—just as they've done in the placing of millions of cubic yards of concrete on jobs of all sizes, all types.



WHAT'S become of the engineers who said that Pumpcrete just wouldn't do for them? We'll tell you—most of these engineers are now Pumpcrete boosters, who can tell you a story of cost reduction by using the Pumpcrete on everything from tunnel jobs to drydocks, warehouses, piers and emplacements—*in fact, on every type of concrete job!*

The others? Today, even the "die-hards" are turning to Pumpcrete, too. Because, today, speed is the essence of the job that faces the American construction industry; and speedier placement of concrete is a basic Pumpcrete advantage. Furthermore, the Pumpcrete pipe line doesn't interfere with other construction operations.

Pumpcretes are made in models with capacities ranging from 15 to 65 cu. yd. per hr. The technical details and performance data you would like to know are fully explained in the book "Pumpcrete Practice," a copy of which will be sent to you upon request. Chain Belt Company, 1664 West Bruce Street, Milwaukee, Wisconsin.

REX **PUMPCRETE**

THE PUMP THAT PUMPS CONCRETE

CHAIN BELT COMPANY OF MILWAUKEE

DU PONT CONSTRUCTION TOPICS DU PONT

"VENTUBE"* HELPS SPEED HARD ROCK TUNNELING

Proves outstanding versatility at Connecticut diversion tunnels

Unusual rock conditions were encountered in driving two water diversion tunnels for the Hemlocks Reservoir to supply Bridgeport, Conn. Despite these conditions, the Bridgeport Hydraulic Co. advanced the work with record speed. This was made possible by delivering to the workmen at the heading a constant flow of fresh air through Du Pont "Ventube" flexible ventilating duct.

Concussion from blasting was heavy, since the tunnel was of relatively small diameter (7 feet). The "Ventube" was maintained at about 75 feet from the heading during drilling operations. And just before shooting, it was removed from the supporting wire cable for a distance of 200 to 300 feet back from the heading to protect it from flying debris. The ease with which "Ventube" can be taken down and quickly reinstalled is a big advantage and is due to its compactness and its patented built-in suspension hooks, which readily adjust themselves on the wire cable.

Almost immediately after shooting, the air line was turned on, and two men would rehang the "Ventube." Fresh air then streamed over the muck pile and heading, and the tunnel foreman and his assistants were quickly able to resume their work.

**"Ventube" is Du Pont's registered trade mark for its rubber impregnated flexible ventilating duct.*

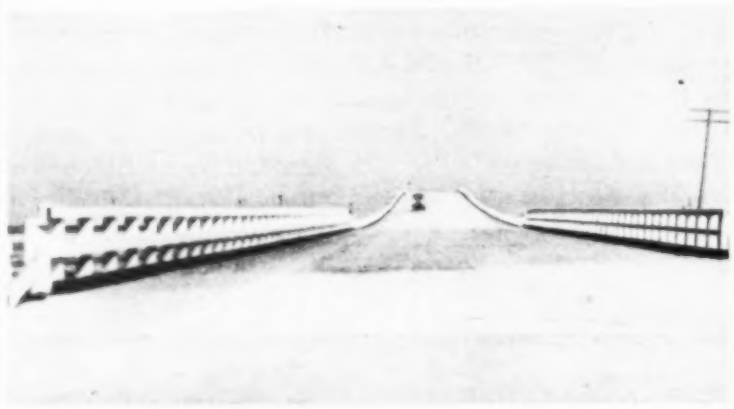
TIMBER BRIDGES GIVEN LONGER LIFE BY "CZC"

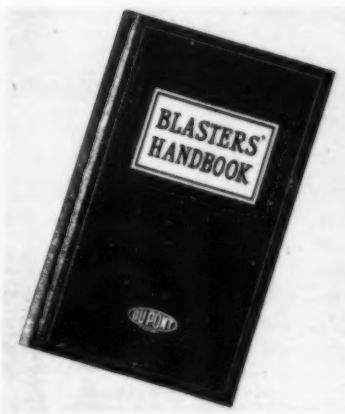
Scarcity of steel for highway bridge construction directs attention to lumber treated with Du Pont "CZC" (Chromated Zinc Chloride). Wood treated in this way is more than a mere substitute for metal . . . it is a distinctive structural material in its own right.

To all the natural advantages of wood, Du Pont "CZC" wood preservative adds the following values: (1) Durability and low maintenance cost, (2) Measurable fire protection, and (3) Maintenance of load bearing strength throughout the life of the structure.

Lumber treated with "CZC" outlasts ordinary timber many times because it is decay resistant and termite repellant, and maintains its full strength over long periods of time. In addition, lumber treated in this way remains clean, odorless, easy to fabricate, and paintable.

Bridge construction is just one of the many ways in which lumber treated with "CZC" can help conserve steel for the defense program and at the same time do an excellent job. For further particulars on money-saving uses of "CZC"-treated lumber, send for your copy of "Facts about Lumber Pressure Treated with Du Pont 'CZC'."





NEW! BLASTERS' HANDBOOK

To meet industry's urgent need for up-to-the-minute facts on industrial explosives, du Pont has just released the 11th Edition of the Blasters' Handbook. Completely revised and expanded to 340 pages, the Handbook contains a wealth of information on the storage, handling and use of commercial blasting agents, supplies and accessories.

This new edition has been prepared by the Technical Section of the Du Pont Explosives Department. As the only reference work of its kind published in this country, it stands as still another evidence of du Pont's service to industry.

Price (Bound in "Fabrikoid") . $1.00

Send orders, with remittance enclosed to E. I. du Pont de Nemours & Co. (Inc.), 2506-B Nemours Building, Wilmington, Del.

DID YOU KNOW?

. . . THAT Du Pont "Gelex"* semi-gelatin dynamite is being used more and more in tunnel work to replace the more expensive gelatin grades.

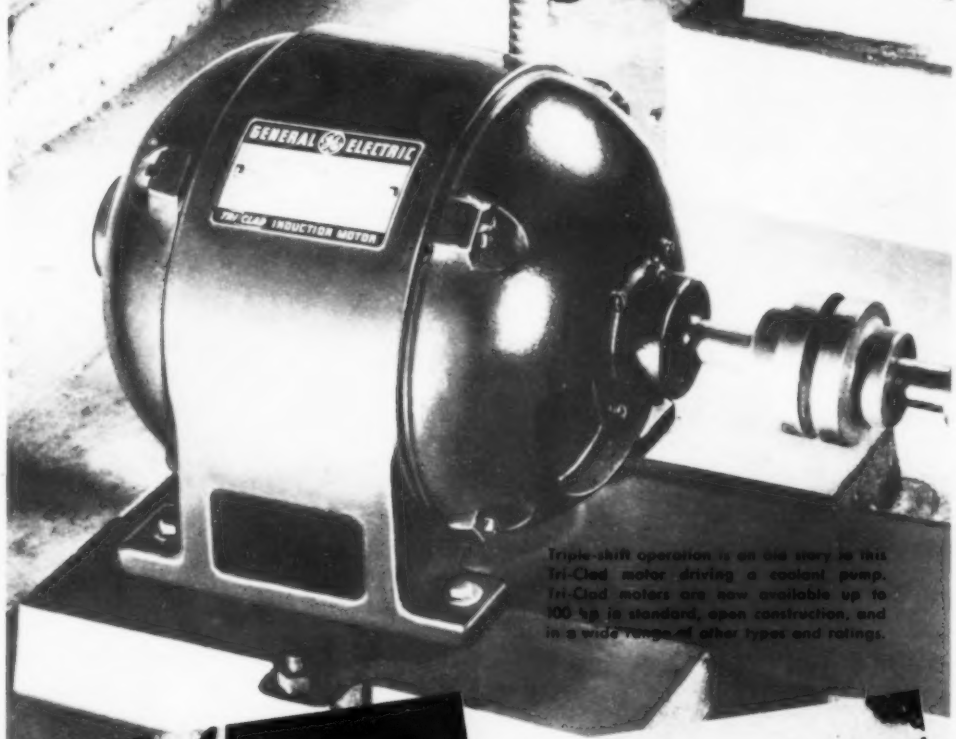
. . . THAT "CZC"-treated lumber is a recognized government standard covered by Master Federal Specification No. TT-W-571B.

. . . THAT Du Pont powder bags are made of the same sturdy material as is "Ventube"? That they have been tested for high insulating properties.

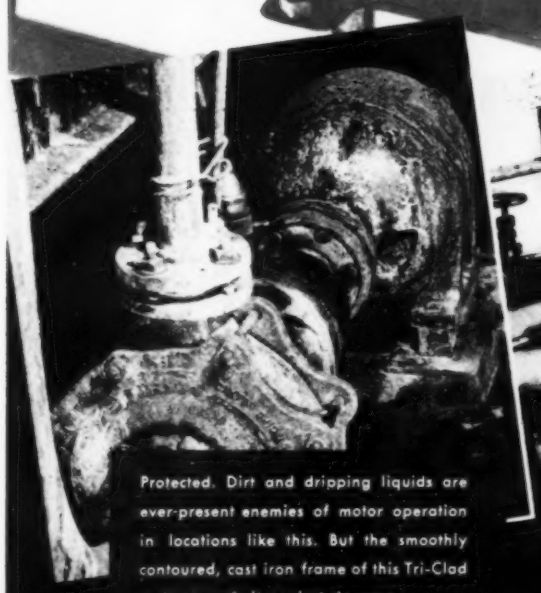
*Trade Mark

★ ★ E. I. DU PONT DE NEMOURS & COMPANY (INC.), WILMINGTON, DELAWARE ★ ★

MORE "STAYING POWER" ON PUMPING JOBS



Triple-shift operation is an old story to this Tri-Clad motor driving a coolant pump. Tri-Clad motors are now available up to 100 hp in standard, open construction, and in a wide range of other types and ratings.



Protected. Dirt and dripping liquids are ever-present enemies of motor operation in locations like this. But the smoothly contoured, cast iron frame of this Tri-Clad motor guards it against damage.

Long Lasting. This Tri-Clad motor is an excellent running mate for the chlorinating pump it drives. Its extra-protection features—cast iron frame, windings of Formex wire, improved bearings—are assurance of long life on important jobs.

The extra protection of TRI-CLAD MOTORS helps keep pumps delivering

NOW—before you buy motors—is the time to solve your pump-motor problems. Wherever continuous pumping is essential to your production—wherever pumps must operate under adverse conditions—your motors must be secure against 1) physical damage, 2) electrical breakdown, 3) operating wear and tear.

Here's where the *extra*-protection features of Tri-Clad motors will help you get the triple-shift operation you need. Their cast-iron frames and end shields exclude falling objects and dripping liquids; their windings, of Formex wire, are resistant to oil, moisture, and heat shock; their improved bearings, completely sealed in cast iron, are protected against the entry of dust and dirt. All these features add up to ***extra staying power*** on jobs where 24-hour production is essential.

How to Get Motors Quicker

USE STANDARD MOTORS. Wherever possible, select standard, open, sleeve-bearing motors. Building fewer "specials" means faster and greater production of motors for war work.

PLACE ORDERS EARLY. Order the motors when you order, or plan for, the equipment they are to drive.

SEND PROPER PRIORITY. Be sure correct priority papers accompany your order and that the priority rating reflects the urgency of the motor's use in the war.

CHECK G.E. for warehouse stocks. A supply of many standard motors are kept on hand to meet urgent war needs. Perhaps the motor you want, or can use with a few simple changes, is available for immediate shipment.

General Electric, Schenectady, N. Y.

General Electric and its employees are proud of the Navy award of Excellence made to its Erie Works for the manufacture of naval ordnance.

BUILT FOR PROTECTION FIRST..TO LAST

GENERAL ELECTRIC

750-107-8080

SEND OUT THESE LIGHT STURDY

Thor Sump Pumps

TO DO ALL THESE JOBS FASTER!

For pumping out

SUMPS	PITS
MAN HOLES	BILGES
DITCHES	CAISSONS
TANKS	COFFERDAMS

Thor Sump Pumps are designed to work efficiently under the most unfavorable conditions. Because the Thor Rotary Air motor is enclosed in an air-tight housing, the pumps operate whether partially or fully submerged. Self-priming, centrifugal impeller type pumps, they operate in dirty water, oil, sludge or sewage. A variable speed throttle controls capacity and speed. An automatic lubrication system keeps all moving parts lubricated. Thor Sump Pumps have also a new design exhaust outlet that eliminates, or in damp climates minimizes, shut-downs due to freezing.

The No. 361-T is a medium size pump most effective up to 60 foot head, with a discharge capacity up to 114 gallons per minute at 90 lbs. air pressure. The No. 381-T is a high head pump designed for continuous pumping at heads from 60 to 160 feet; discharge capacity up to 65 gallons per minute at a 160 foot head with 90 lbs. pressure.

For full information on Thor Sump Pumps, Rock Drills, Paving Breakers, Clay Diggers and related Contractors Air Tools write for Thor Catalog No. 42.

COMPRESSED AIR INSTITUTE

$1,000.00 Prize Contest

Contest now streamlined for war. Prizes doubled — Now $1,000.00. Closing date extended to July 1, 1942. There is still time to enter.

For free rules, write: .

Educational Director, Compressed Air Institute,
East Orange, New Jersey

Thor *Portable Pneumatic and Electric Tools*

INDEPENDENT PNEUMATIC TOOL COMPANY

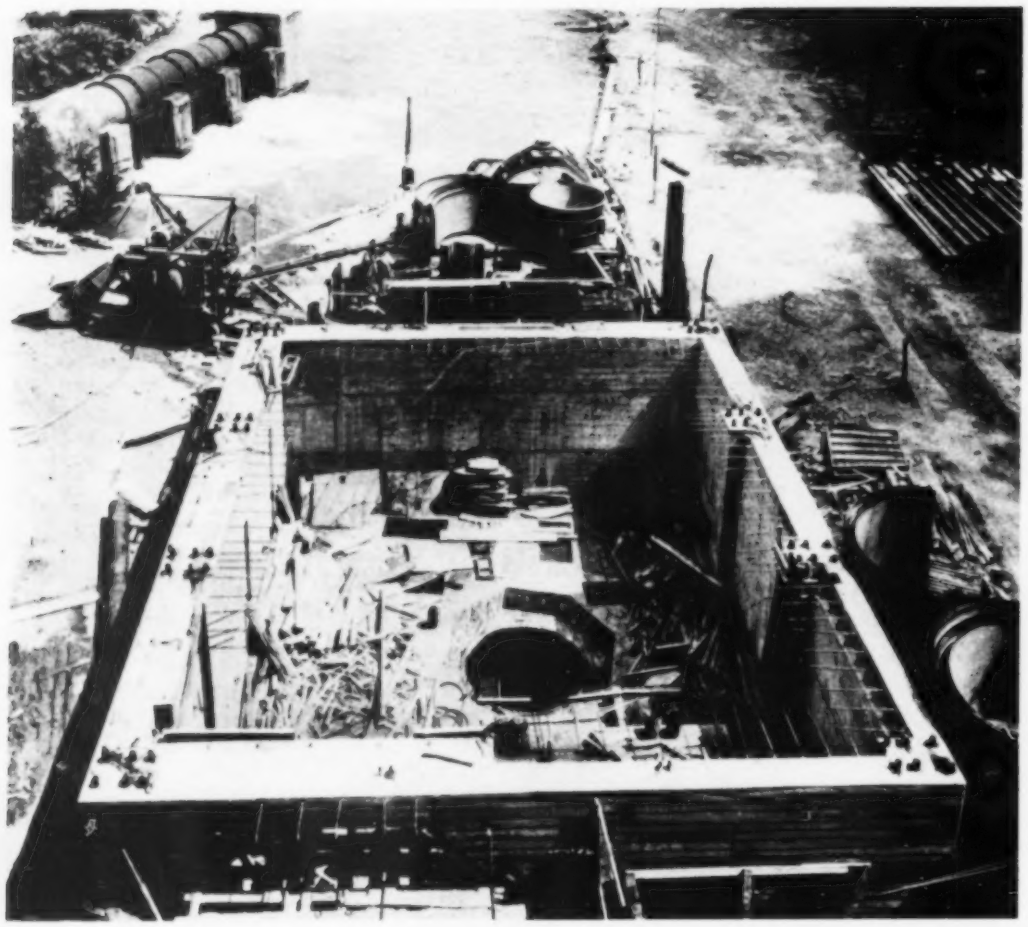
600 W. JACKSON BOULEVARD, CHICAGO, ILL.

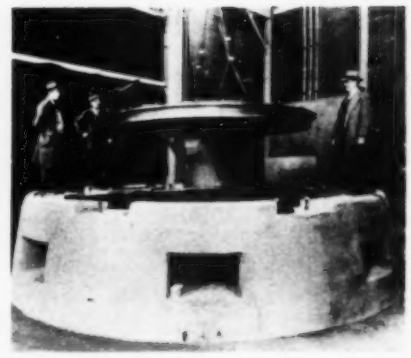
Branches in Principal Cities

ROCK
from Coast to Coast!
ROCK digging—that's the real test of shovel performance—and if you have a *real* Rock Shovel you don't have to worry about output in *any digging!*
The fact that no shovel boom of Northwest design and construction built since 1932 has ever failed, combined with the Northwest Dual Independent Crowd that utilizes force other shovels waste, means dependability and output—and you can't have too much dependability—or output today. Getting the job done is what counts. Plan for a *proved* rock shovel—a *Northwest Rock Shovel.*
NORTHWEST ENGINEERING CO.
1728 Steger Building
28 E. Jackson Boulevard
Chicago
NORTHWEST
If it's a real Rock Shovel you won't have to worry about output in dirt

HYDRO-ELECTRIC STATION, Lockport, N. Y. **OWNER:** Hydraulic Race Co., Lockport, N. Y. (Niagara Hudson System)

CONTRACTOR: H. F. Darling, Buffalo, N. Y.





Hurry up with that power ...THIS IS WAR!

No wonder they wanted this hydro-electric station in a hurry. Its power is needed to turn out war materials.

This is what prompted Contractor H. F. Darling to say that he used Lehigh Early Strength Cement at every point where its use could save a construction hour. The need for concrete that cured and hardened *more quickly;* that permitted forms to be stripped *more quickly;* that could bear its expected load *more quickly*—these things dictated to the contractor his use of Lehigh Early Strength Cement.

For . . . this cement makes service-strength concrete in 1/3 to 1/5 the time needed by normal cement!

All three Lehigh cements . . . Lehigh Mortar, Normal and Early Strength . . . were used in this power station job; if we emphasize Lehigh Early Strength Cement it is because of the all-importance, these days, of Time. For additional information write the Lehigh Service Department.

Lehigh EARLY STRENGTH CEMENT for service-strength concrete in a hurry

LEHIGH PORTLAND CEMENT COMPANY • ALLENTOWN, PA. • CHICAGO, ILL. • SPOKANE, WASH.

They're Laying Bomber Runways of Minus 1" Slump Concrete—25 Ft. Slab—

AT 250 LINEAR FT. per HOUR!

AS SHOWN HERE
JAEGER Screw SPREADER
JAEGER Type "H" FINISHER
Placed Up to 135 Cu. Yds. an Hour — AVERAGED Over 120 Cu. Yds. an Hour Day After Day, on Muroc Bomber Range, California — Ferry & Pearson, Contractors

Look at These Records of Production: Dry Concrete Re-Mixed, Spread and Finished as Fast as Dual Drum or Multiple Pavers Can Pour — No Segregation — Denser, Smoother Slab — Smaller Paving Crews

Could not have handled the very dry concrete in 25' width without Jaeger Team on Ft. Wayne, Ind. Airport, reports James A. McKay & Sons.

On 86 miles of 20'-24' slab all engineers highly pleased with work of our 4 Jaeger Spreaders — Koss Constr. Co.

On Higley Airport, Jaeger Team placed 362' per hour of 1½" slump concrete 12'6" wide without labor in front of machines — no trace of segregation — Arizona Constr.

Ran crew with 3 to 5 less men — C. H. Atkinson Pvg. Co.

63 miles of 20' slab laid in 42 days by 4 Jaeger Finishers on Ford Willow Run Bomber Plant.

On Pennsylvania Turnpike (12' slab, 9" thick, 1"-1½" slump concrete) Adam Eidemiller did 5160' in 14 hours, Tri-State Engr. averaged 4000 sq. yds. daily on 167,000 sq. yds. contract, both using Jaeger Teams.

Bump grinder used only 1 day on 5 miles of 25' pavement at Ravenna, Ohio Arsenal — Hollinger-Davidson Co.

Highway Dept. tests, in various States, prove Jaeger Re-Mixing Screw increases strength and density of concrete.

Spreader can be equipped to spread and finish bituminous surfaces — Barber Constr. Co. laid up to 150 tons per hour of 2-course resurfacing, Illinois I-11 Specifications.

GET THE PROOF—Contractors' Signed Reports on Dozens of Jobs, Plus Data, Specifications YOU NEED TO FIGURE TODAY'S PAVING WORK

THE JAEGER MACHINE CO.

World's Largest Mfr. of Spreading, Finishing Equipt., 800 DUBLIN AVE., COLUMBUS, O.

This is number 10 in a series of informative articles prepared by Macwhyte Wire Rope Company. The purpose of this series is to help wire rope users in these critical times to get the longest possible service from present ropes . . . through making useful facts on rope care more widely known.

CORROSION IN WIRE ROPE

Corrosion is one of wire rope's worst enemies. It strikes without warning. It often reaches an advanced stage before being noticed. And even though checked it still leaves its imprint of destruction.

We can better understand corrosion (and how to prevent it) by knowing what it is, what causes it, where and when it is likely to strike.

What Corrosion Is

The dictionary defines corrosion as "an action of eating or wearing away by slow degrees; a gradual decay by crumbling or surface disintegration; a gradual breaking down of the material attacked."

Two General Classes

There are two distinct types of corrosion:

Acid corrosion, and

Alkaline (or salt) corrosion.

In the case of acid corrosion the wires become pitted and stress concentrates at the reduced cross-sections where pits are located. This causes premature failure of the rope.

In the case of alkaline, or salt corrosion, the wires become encrusted with a layer of the products of corrosion. The rope becomes rust bound, for example. Alkaline corrosion increases the size and weight of the steel wires.

Acid and alkaline corrosion both may occur when ropes are operating in (or subjected to) ordinary atmosphere or weathering, or special conditions which subject the rope to either acid or alkaline substances.

What Happens When Corrosion Sets In?

When this occurs the rope loses its flexibility. Then some of the wires are overloaded, which causes them to break. This is the "beginning of the end" for the entire rope. It starts to wear away rapidly.

No Way To Determine Rope's Safety Once Corrosion Sets In

Corrosion, probably the most severe type of deterioration, is the most difficult to evaluate. Ordinarily when internal corrosion has taken place, external corrosion is also present. But it is impossible to accurately estimate by any known means the remaining strength or safety factor of the rope once corrosion has set in.

More Information

The next advertisement in this series prepared by the Macwhyte Wire Rope Company will discuss ways of preventing corrosion, or in those cases where corrosion has gotten a start how to check it from doing further damage.

Feel free to write us on this, or any problem you may have. We are ready at all times to do whatever we can to help you get the most from your wire rope.

* * *

VICTIMS OF CORROSION!

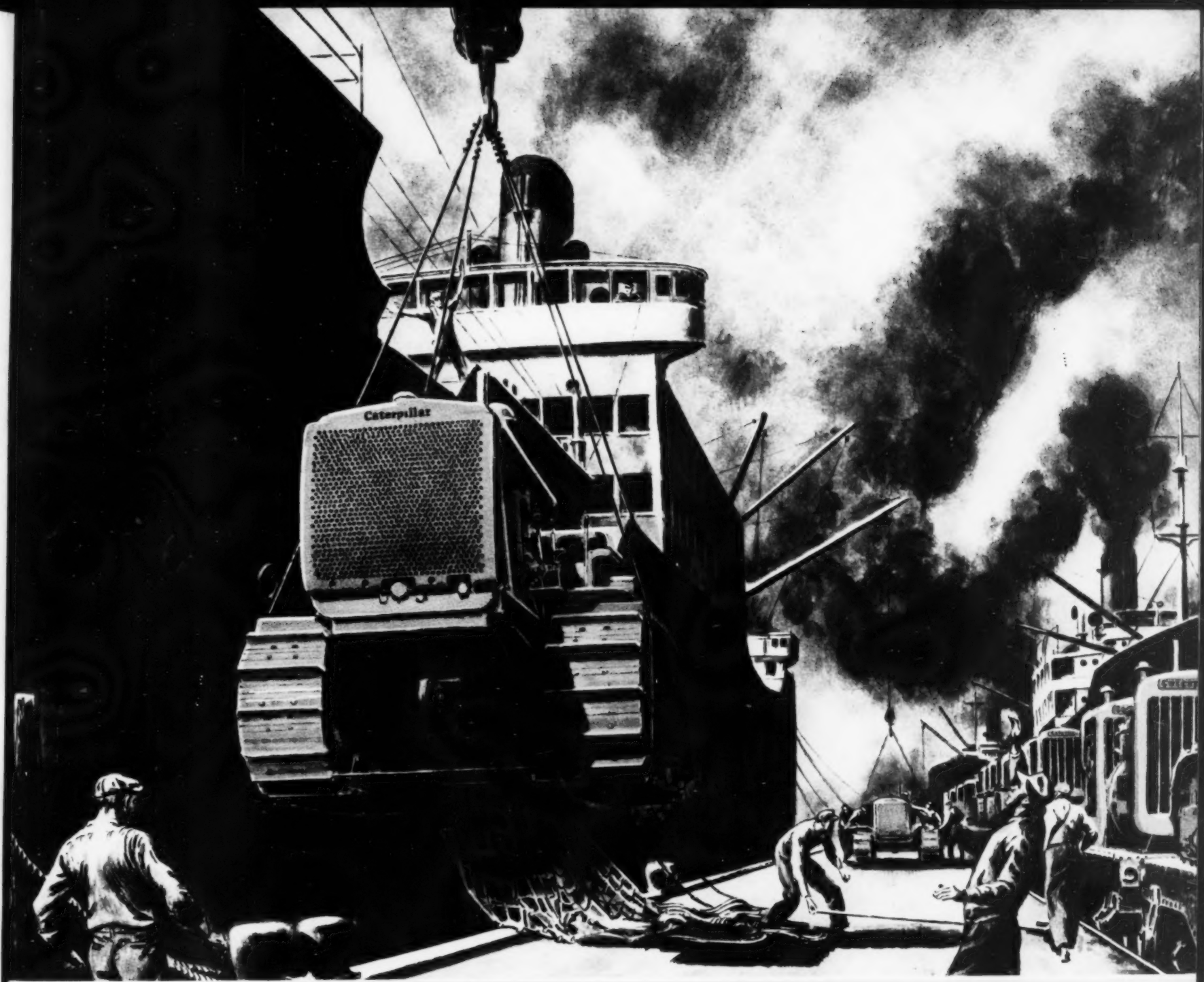
These ropes never had a chance to live a full and useful life. Left unprotected against the elements, they were attacked and needlessly destroyed by the ever present wire rope saboteur: corrosion.

A very good example of Alkaline Corrosion. Notice how outside wires are partially eaten away—a rope unfit and unsafe. Crown wires have broken up. The other side of the rope next to the sheave has few broken wires . . . but if flexed in the opposite direction they would also break.

This rope was exposed to acid fumes which caused the wires to become brittle. This reduced their fatigue resistance and resulted in the wires breaking while bending over sheaves.

Macwhyte Company Manufactures:
MACWHYTE PREformed and Internally Lubricated Wire Rope
Monarch WHYTE STRAND Wire Rope
MACWHYTE Special Traction Elevator Cable
MACWHYTE Braided Wire Rope Slings
MACWHYTE Aircraft Cables and Tie Rods

MACWHYTE WIRE ROPE
Made by MACWHYTE COMPANY, Kenosha, Wis.
NEW YORK • PITTSBURGH • CHICAGO • FT. WORTH
PORTLAND • SEATTLE • SAN FRANCISCO
DISTRIBUTORS THROUGHOUT THE U. S. A.



OFF TO THE FIGHTING FRONTS

THIS vast war has a thousand battle-fronts on which "Caterpillar" Diesel-powered equipment can help — and *is* helping.

Whereas most machines are built for but one purpose or field, "Caterpillar" Diesel Tractors, Engines and Electric Sets are born with the versatility to handle innumerable jobs in a wide range of activities: On construction projects for carrying out the broad strategies of war; in industries providing needed war materials and implements; along the supply lines; and on the actual fighting fronts themselves.

"Caterpillar" products are ideally suited to this kind of war — a war of machines operated by a fighting force of highly trained specialists.

And since they are fundamentally sound in their present design — proved over and over to do a good job no matter what the assignment — there is no delay in turning "plowshares into swords" . . . no loss of time for factory retooling or change-over from one type of production to another. The "all-clear" signal has been set — and spiked down — toward the all-out effort of *winning the war!*

SOME "CATERPILLAR" BATTLE-FRONTS

TRACTORS AND MOTOR GRADERS: Building and maintaining basic, training and combat flying fields; naval bases and shipyards; military bases, roads, cantonments and proving grounds; coast defenses; aircraft, engine, ordnance and munitions plants.

Helping the oil, lumber, mining, steel and other basic industries to provide vitally needed raw materials.

Aiding the transportation of supplies.

Erecting field fortifications and gun emplacements; throwing up earthworks and tank obstructions; filling bomb craters; clearing spaces for troop concentrations and movements; digging trenches; building dams for water supplies and defense floodings; moving heavy artillery, disabled tanks and other fighting equipment in combat zones.

ENGINES AND ELECTRIC SETS: Providing light and driving machinery on construction, oil drilling, mining and other projects; in war-industry factories, sawmills, cotton-gins, machine and repair shops.

Providing light and power for air, naval and military bases, anti-aircraft defenses.

Providing propulsion power for many types of small essential watercraft; auxiliary and emergency light and power for combat, supply and other larger ships.

CATERPILLAR *DIESEL*

REG. U.S. PAT. OFF.

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS

TO WIN THE WAR: WORK—FIGHT—BUY DEFENSE BONDS!

Weapons of War

on the home front

*A.M.** keeps 'em rolling

Tanks, guns, planes and ships are not the only weapons of war! Service tools, inspection instruments, good service shop equipment in the hands of trained mechanics are weapons of war on the home front — weapons essential to Victory—because they are weapons essential to building for Victory! These are the tools that keep your trucks, trailers and mobile shovel-cranes going. *Your* equipment must be safeguarded and maintained now, not only to keep operating costs down, but to keep every piece of it in the front line of duty—for Victory! Good A.M. (Axle Maintenance*) is the "ounce of prevention" that will save many a "pound of cure" for vital equipment that must be kept on the job for the duration. Timken has some valuable free A.M. aids for you. Write for them today!

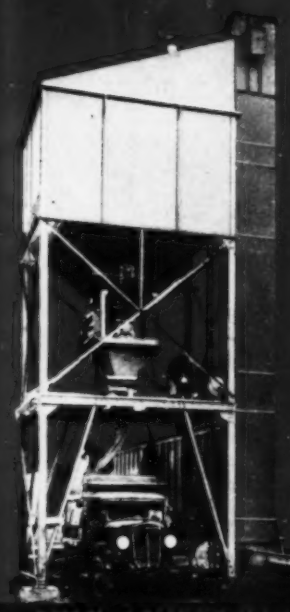
TIMKEN AXLES

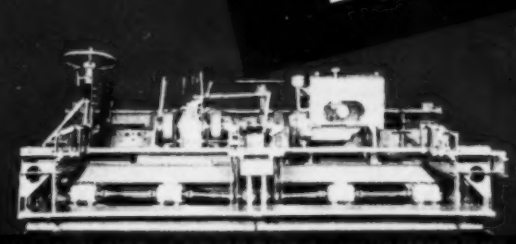
THE TIMKEN-DETROIT AXLE CO., DETROIT, MICH. • WISCONSIN AXLE DIVISION, OSHKOSH, WIS.

Timken's Job: To Axe the Axis with Axles

PEAK PERFORMANCE PROTECTION

YOUR BLAW-KNOX DEALER WILL HELP KEEP YOUR CONSTRUCTION EQUIPMENT IN FIRST-CLASS SHAPE





BULK CEMENT PLANTS | CONCRETE SPREADERS & FINISHERS | TRUCK MIXERS | BINS AND BATCHERS

COAST TO COAST SERVICE

ALABAMA	
Birmingham	Young & Vann Supply Company
ARIZONA	
Phoenix	State Tractor Equipment Company
ARKANSAS	
Little Rock	Lyons Machinery Company
CALIFORNIA	
Los Angeles	LeRoi-Rix Machinery Company
Los Angeles	F. M. Ornitz
San Francisco	C. H. Grant Company
COLORADO	
Denver	Ray Corson Machinery Company
CONNECTICUT	
New Haven	The W. I. Clark Company
DISTRICT OF COLUMBIA	
Washington	Matt A. Doetsch Machinery Company
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IOWA	
Davenport	Gierke-Robinson Company
Des Moines	Herman M. Brown Company
KENTUCKY	
Louisville	Brandeis Machinery & Supply Company
LOUISIANA	
New Orleans	Southern States Equipment Company
MAINE	
Portland	Stanley & Cadigan Company
MARYLAND	
Baltimore	Henry H. Meyer Company, Inc.
MASSACHUSETTS	
Boston	The Equipment Company
MICHIGAN	
Detroit	Wm. P. Favorite Company
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Billings	Western Construction Equipment Company
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Albuquerque	Power Equipment Company
NEW YORK	
Albany	Larkin Equipment Company
Buffalo	Trevor Corporation
New York	R. E. Brooks Company
NORTH CAROLINA	
Raleigh	Carolina Tractor & Equipment Company
Salisbury	Carolina Tractor & Equipment Company
NORTH DAKOTA	
Fargo	Dakota Tractor & Equipment Company
OHIO	
Cleveland	H. B. Fuller Equipment Company
Columbus	W. W. Williams Company
Cincinnati	W. W. Williams Company
OKLAHOMA	
Oklahoma City	Leland Equipment Company
Tulsa	Leland Equipment Company
OREGON	
Portland	Contractors Equipment Corporation
PENNSYLVANIA	
Harrisburg	Dravo-Doyle Company
Philadelphia	Giles & Ransome
Pittsburgh	Dravo-Doyle Company
SOUTH CAROLINA	
Columbia	Jeff Hunt Road Machinery Company
TENNESSEE	
Chattanooga	Nixon-Hasselle Company
Knoxville	Wilson-Weesner-Wilkinson Company
Nashville	Wilson-Weesner-Wilkinson Company
TEXAS	
Dallas	Conley-Lott-Nichols Machinery Company
Houston	R. B. Everett & Company
San Antonio	Cochran Equipment Company
UTAH	
Salt Lake City	Lund Machinery Company
VERMONT	
Barre	Casellini-Venable Corporation
VIRGINIA	
Roanoke	Roanoke Tractor & Equipment Corporation
Richmond	Roanoke Tractor & Equipment Corporation
WASHINGTON	
Seattle	L. A. Snow Company
Spokane	Empire Equipment Company
WEST VIRGINIA	
Charleston	Charleston Tractor & Equipment Corporation
Clarksburg	Charleston Tractor & Equipment Corporation
WISCONSIN	
Milwaukee	Hunter Tractor & Machinery Company

DON'T wait until your equipment breaks down . . . have it inspected now by your nearby Blaw-Knox dealer. His technical ingenuity and wide experience will help assure you of constant operating efficiency!

BLAW-KNOX

DIVISION OF BLAW-KNOX COMPANY
Farmers Bank Building
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CONCRETE FINISHING MACHINES · CONCRETE SPREADERS · ROAD FORMS
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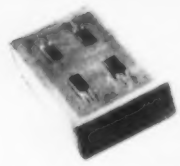
CONCRETE BUCKETS · STEEL STREET FORMS · TRUCK TURNTABLES

BINS & BATCHERS
CLAMSHELL BUCKETS
TAMPING ROLLERS

The object of most physical tests made on materials, equipment, and structures is to determine the magnitude, kind, and number of stresses—the amount of resistance a member or structure offers to loading, twisting, vibration, or distortion under specific conditions. Some of the many types of stram gages and auxiliary equipment needed in stress determination are the following:



RECORDING SCRATCH AND METALECTRIC STRAIN GAGES

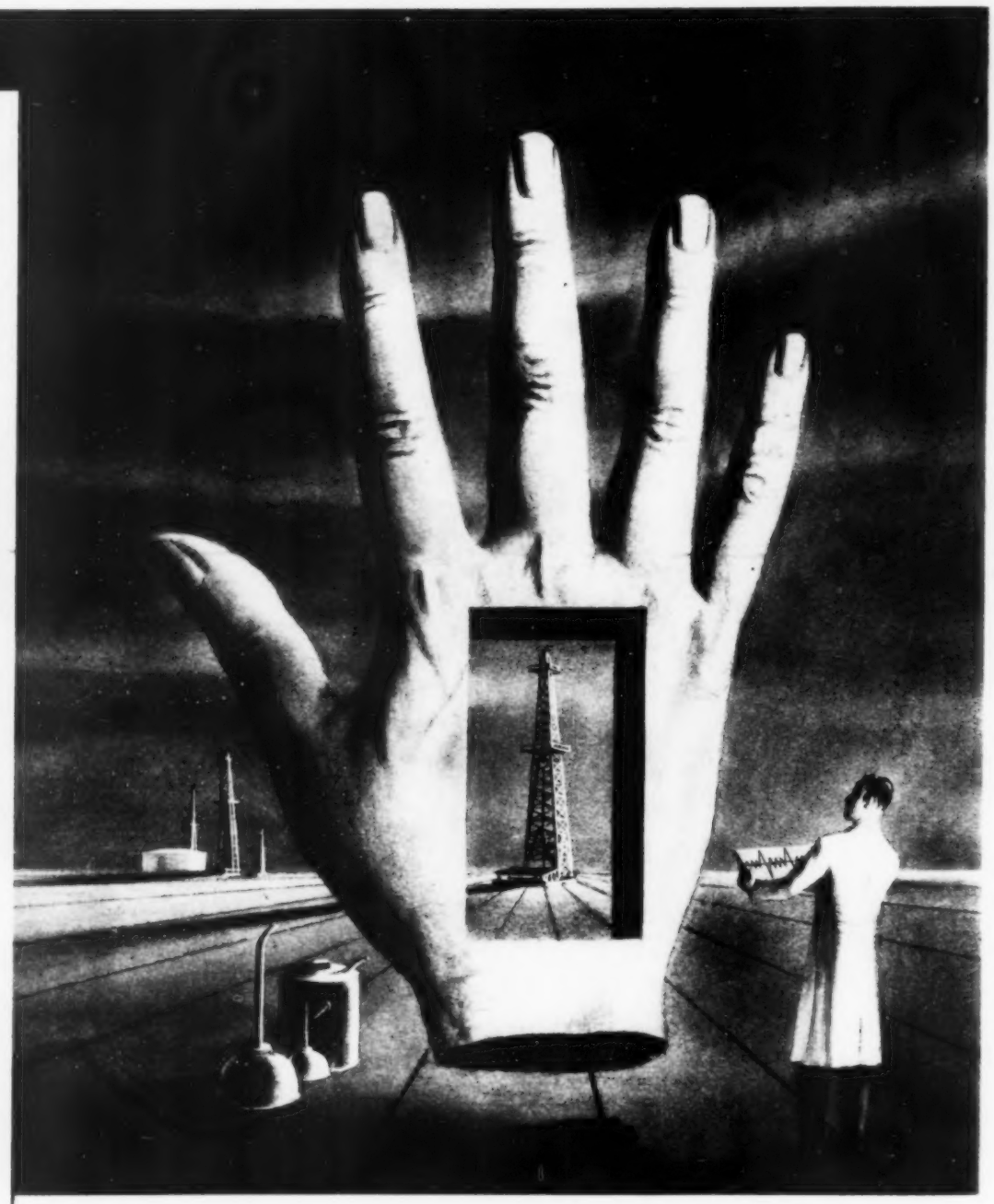
are representative of the mechanical and electrical types of gages. Both gages are light-weight, simple, inexpensive, and reliable. The field of usefulness of these gages is almost unlimited. *Auxiliaries:* scratch gages, microscope for reading records, control box for static loads, amplifiers and recorders for dynamic loads.

SLOW DYNAMIC CONTROL EQUIPMENT AND CALIBRATOR

Designed for use with electric and magnetic stram gages, static and slowly applied loads. Calibrator for instantaneous checking during dynamic testing of resistance type stram gages.

* * *

Other auxiliary testing equipment in this group: Spring and motor driven scratch gages; inductor telemeter; Stresscoat, a brittle lacquer for aid in stress analysis; microscope and viewing equipment.



He measures stresses through a seeing hand

In the oil industry, as in every commercial field today, avoidable breakdowns can no longer be tolerated. Overnight, expert *pre-testing* of equipment has become a national "must."

It was for this precise purpose that WAUGH LABORATORIES was formed . . . to make available a complete line of dependable test instruments and machines, together with an experienced engineering field staff and laboratory facilities, for the determination and analysis of strains, forces, and vibrations in and on structures of all kinds.

For information regarding its services as applied to individual industries, write to Nereus H. Roy, *Director*, at the address below.

WAUGH *Laboratories*

A DIVISION OF WAUGH EQUIPMENT COMPANY · 420 LEXINGTON AVENUE, NEW YORK, N. Y.

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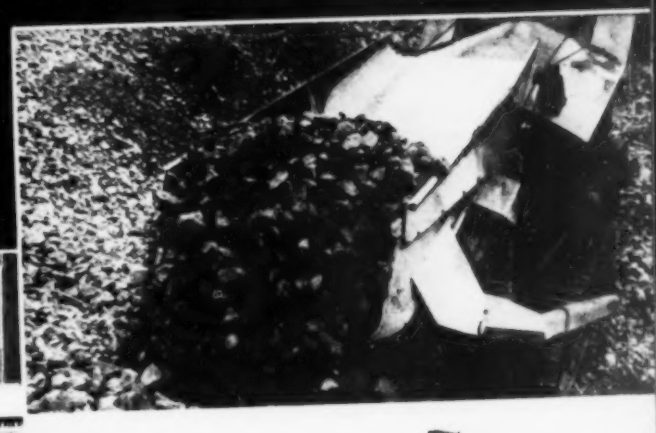
FAST-STEPPING MOBILOADER

—handles Big Loads and Many Materials



To America's plea for bigger production machines, Athey's answer is the Model 8 MobiLoader.

Here's a big-capacity loader for 1942's emergency—a fast-moving, portable loader that is matching big shovel production. Output is increased, equipment investment is reduced, operating costs are lowered, wherever this revolutionary machine has gone to work.

Powered by the "Caterpillar" Diesel D8 Tractor, the Athey Model 8 MobiLoader digs toughest, compacted materials, has ample power in reserve for crowding action. It's making production records handling earth, stone, crushed rock, gravel, clay, coal, iron ore and beets. Large size bucket capacities (ranging from 2.7 to 9 cubic yards, depending upon the material) make big jobs move fast—the important thing today.

Proof of the MobiLoader's success comes from two years' performance on a variety of jobs. It is today serving with the Armed Forces—speeding the delivery of vital iron ore—hurrying essential factory construction—working on airports, access roads, and bases.

The Athey factory is going "full steam" to win this war. Every employee and every machine is producing with that single aim. Athey products are going to Uncle Sam. We know you understand this when your deliveries are delayed.

Center—With a 4.7 cubic yard bucket, this Model 8 MobiLoader is excavating earth in Colorado. Right top, a big bucketful of flux rock is loaded by this MobiLoader in Michigan. Right lower, on Chicago airport improvement.

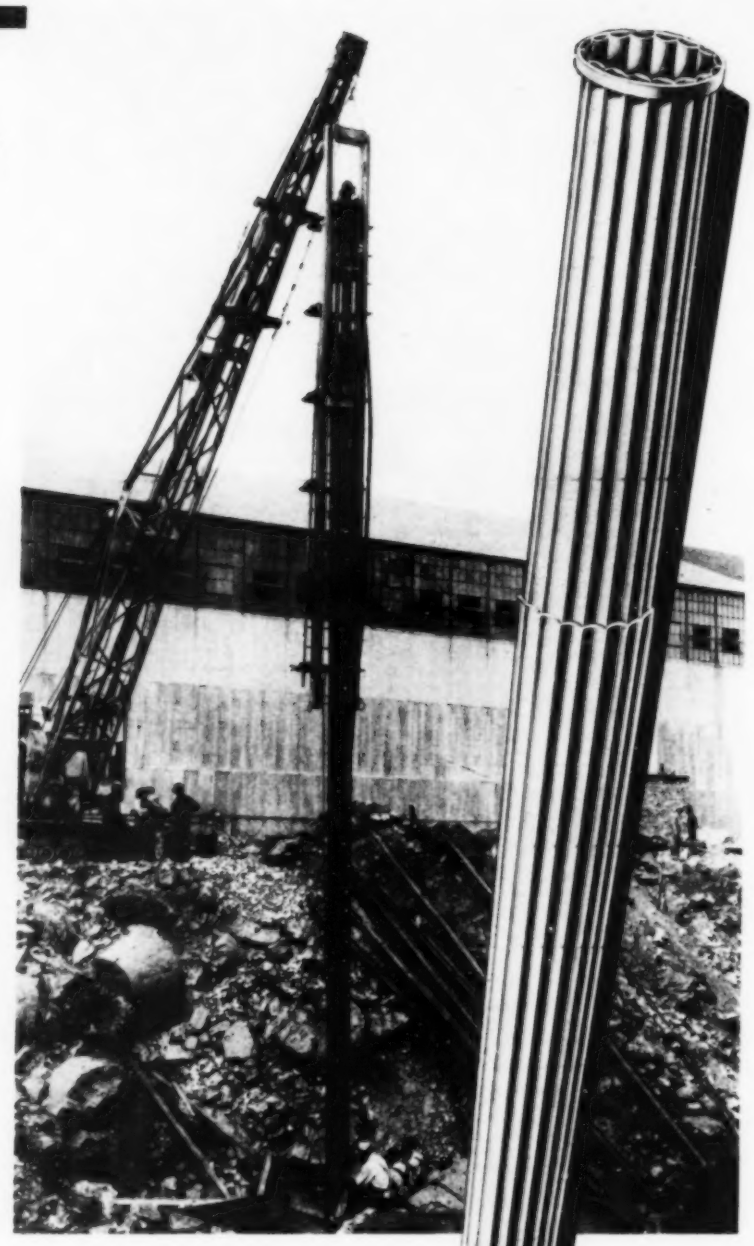
ATHEY

TRUSS WHEEL CO., 5631 W. 65th STREET, CHICAGO, ILL.

"Tough Job"

THEY SAID—

but MONOTUBES were driven 40 ft. from crane!



● Steel slag and molten metal refuse was scattered all over the site. Yet the sturdy Union Metal Monotubes used for the installation of cast-in-place concrete piles were driven to a depth of 53 feet —and driven with standard leads and hammer operated from a crawler crane on a bank *40 feet away.*

Monotube steel casings are so strong and rigid they require no heavy core or mandrel. So it was not necessary to use special driving equipment on this midwestern steel company's "tough" job.

Interested in speeding up *your* jobs? Then consider these time-saving advantages of the Monotube Method of Pile Construction . . .

1. *SPEEDY Handling.* Monotube steel casings are light in weight for fast, economical handling.

2. *SPEEDY Driving.* Tapered Monotubes require no core or mandrel and can be driven with any crawler crane equipped with standard leads and hammer.

3. *SPEEDY Extension.* Use of Extendible Monotubes permits installation of varying pile lengths on the job without delay or waste.

4. *SPEEDY Inspection.* Hollow, tubular design enables you to inspect casing quickly and thoroughly from top to toe.

Monotubes are available in a gauge, taper, and length to meet load requirements in every soil condition. And Union Metal engineers will show you how they can be used to best advantage. Write today for Catalog No. 68A.

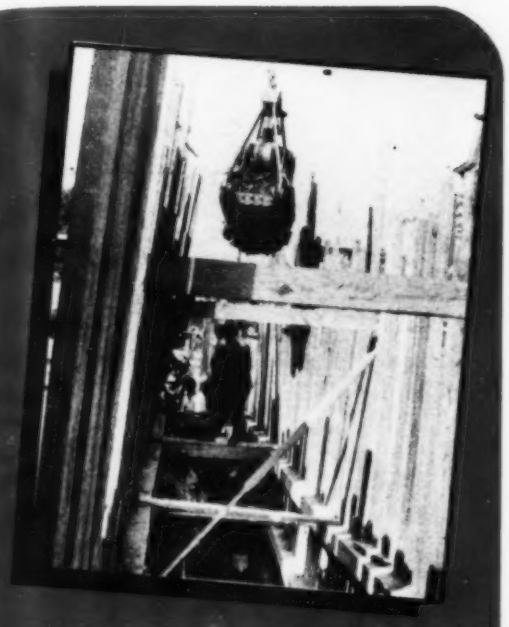
UNION METAL

KEEP 'EM FLYING

THE UNION METAL MANUFACTURING COMPANY

CANTON, OHIO

Clamshells *versus* Bombshells

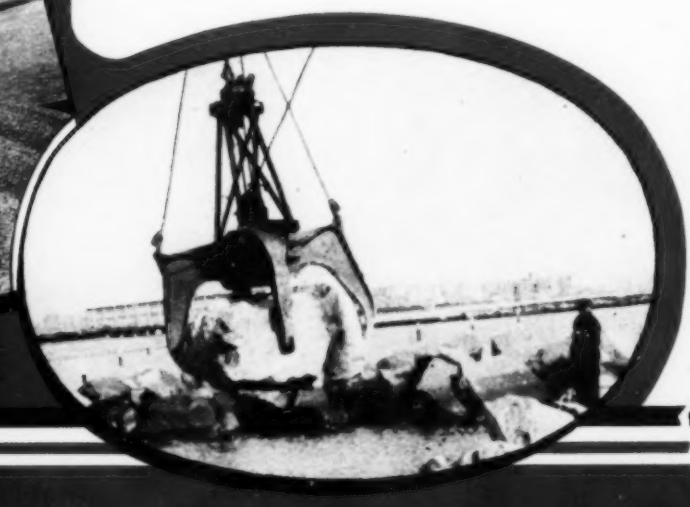


OWEN BUCKETS & GRAPPLES

SINCE DEFENSE and OFFENSE begin with *construction,* Owen Buckets and Grapples are predominantly in the forefront of activity in plants and fortresses throughout the world.

Their efficiency will aid in speeding production—in lessening the effectiveness of bombs and shells—and in speeding the inevitable day of victory.

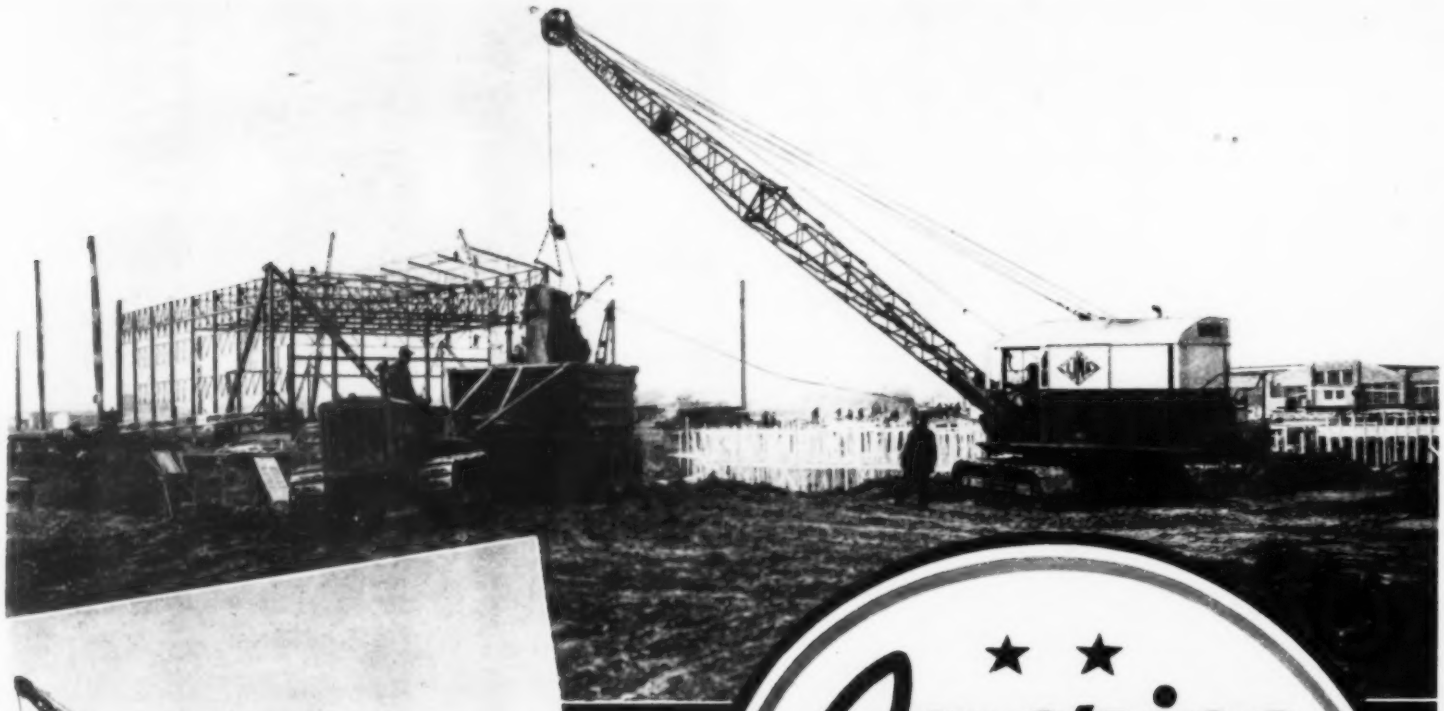
There are Owen Buckets for every digging and handling use—and Owen Grapples for every stone handling requirement.



THE OWEN BUCKET CO.

6020 BREAKWATER AVE., CLEVELAND, O.

Branches: New York • Philadelphia • Chicago • Berkeley, Calif.



★ ★

America HAS A JOB TO DO-

Today's big job necessitates speedy, dependable, hard-hitting excavating and material handling equipment. Unless you have modern, efficient equipment, you are not in a position to give full support to the Nation's needs in this great emergency. Why not look into the merits of LIMA shovels, draglines, and cranes today. You will find them to be up to the minute in design, quality and workmanship. LIMA shovels are built in a range of sizes from ¾ to 3½ yards capacity. Cranes, 13 tons to 65 tons capacity and dragline capacities are variable.

LIMA LOCOMOTIVE WORKS, INCORPORATED

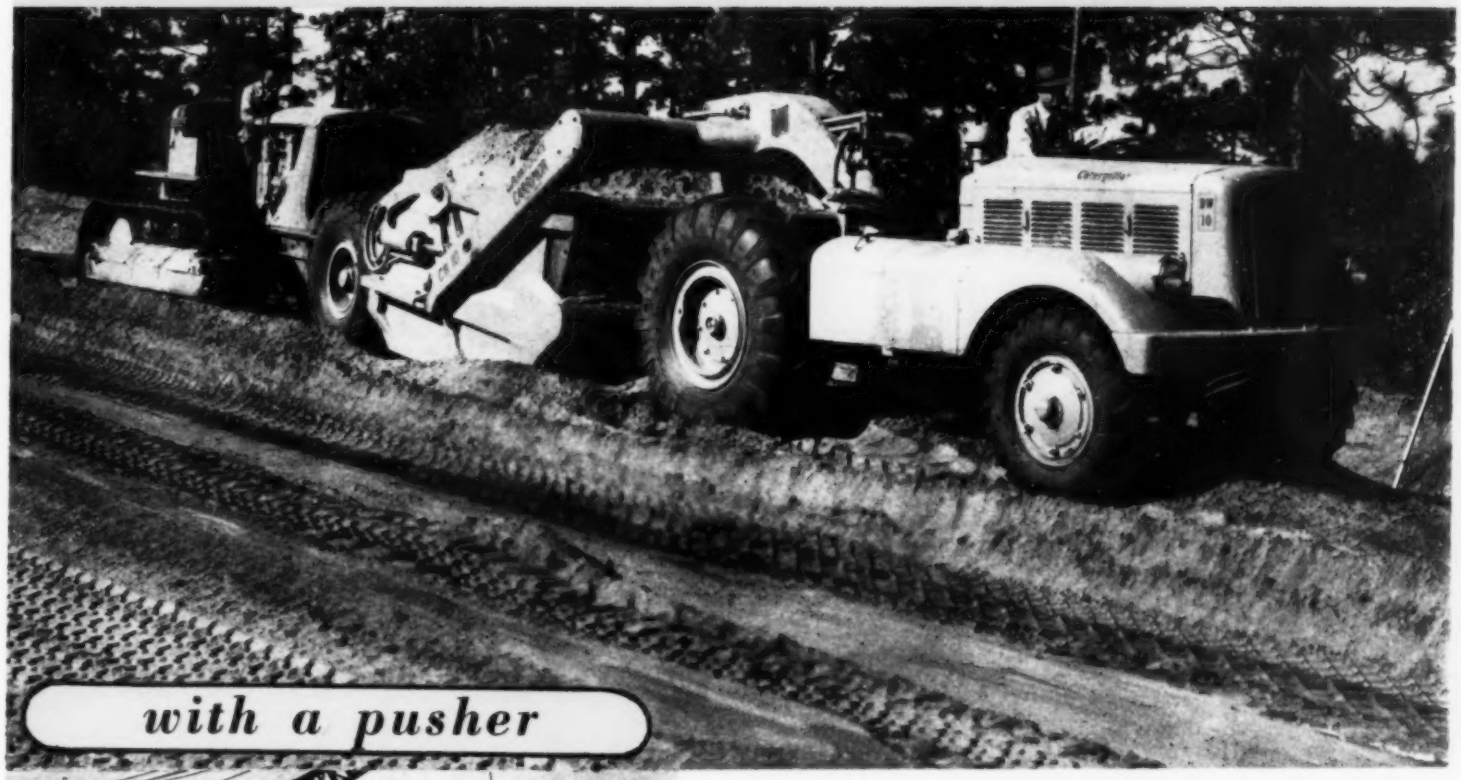
SHOVEL and CRANE DIVISION - LIMA, OHIO, U. S. A.

NEWARK, N. J. NEW YORK, N. Y. DALLAS, TEXAS PHILADELPHIA, PA. SAN FRANCISCO, CALIF.
PORTLAND, ORE. LOS ANGELES, CALIF. SEATTLE, WASH. SPOKANE, WASH.
MEMPHIS, TENN. MONTREAL, Quebec, Can.

LIMA

CRANES • DRAGLINES • SHOVELS • PULL-SHOVELS

Heap 'em high!



with a pusher

with a dragline

or under a bin

COMPLETE EQUIPMENT

EARTHMOVING — Hydraulic and Cable Scrapers, Trail-builders, Bulldozers, Rippers, Tampers, and Scraper Pushers.
LAND CLEARING — Treedozers, Brushcutters, Root Cutters, Brush Rakes, Stinger Blades, Weed Eradicators, Stump Splitters.
SNOW REMOVAL — Tractor Snow Plows.

FOR ECONOMICAL HIGH-SPEED, LONG HAUL EARTHMOVING—

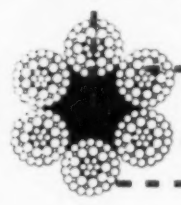
Use the CW-10 "CARRIMOR" and take advantage of all these features: *Hydraulic Control* provides smooth, powerful, trouble-free control, instantaneous response and easy operation. *Curved Cutting Edge*, bowl bottom and pushout gate, as well as the correct cutting angle make loading easy. *Minimum Clearances*, closely held, and positive power on the pushout gate make dumping clean and spreading is held to any uniform depth. *Good Brakes* and a low center of gravity provide safety and stability and reduce danger of tipping and jack-knifing to a minimum.

Because the unit has speeds to match varying haul road conditions, is easy to maneuver, has a full ten-yard capacity and is easy on the operator, *high average speed* and *big yardage* result. Versatility is a feature, too. The same outfit can be loaded with dragline or shovel, or under a bin and used as a hauling unit if desired, since there are no overhead obstructions, correct design having eliminated the need for overhead bracing. Made of the finest materials, to a tried and proved design, by expert workmen, these CW-10 "CARRIMORS" are making earthmoving history on scores of jobs all over the country.

LaPLANT-CHOATE
Cable Address: "LAPCHOATE" *Manufacturing Co* INC. Cedar Rapids Iowa, U.S.A.
EARTH MOVING - LAND CLEARING - SNOW REMOVAL EQUIPMENT

WIRE ROPE PROTECTION

for All-out Production



DON'T gamble with All-Out Production. Give your wire ropes maximum protection. Wear, rust and corrosion must be held to a minimum . . . and will be when you use *Texaco Crater.*

Texaco Crater penetrates to the very core of wire rope, coating each wire in a tough, viscous film that cuts down wear, seals out moisture, prolongs rope life.

The outstanding performance that has made Texaco preferred in the fields listed in the panel has made it preferred on prominent construction jobs throughout the country.

These Texaco users enjoy many benefits that can also be yours. A Texaco Lubrication Engineer will gladly cooperate . . . just phone the nearest of more than 2300 Texaco distribution points in the 48 States, or write:

The Texas Company, 135 E. 42nd Street, New York, N. Y.

THEY PREFER TEXACO

★ More revenue airline miles in the U. S. are flown with Texaco than with any other brand.

★ More buses, more bus lines and more bus-miles are lubricated with Texaco than with any other brand.

★ More stationary Diesel horsepower in the U. S. is lubricated with Texaco than with any other brand.

★ More Diesel horsepower on streamlined trains in the U. S. is lubricated with Texaco than with all other brands combined.

★ More locomotives and cars in the U.S. are lubricated with Texaco than with any other brand.

FOR YOUR ENJOYMENT
FRED ALLEN every Sunday night. See your local newspaper for time and station.

Care for your Car ...for your Country

HELP WIN THE WAR BY RETURNING EMPTY DRUMS PROMPTLY

TEXACO

TEXACO Lubricants and Fuels

FOR ALL CONTRACTORS' EQUIPMENT

How to uncover a billion-dollar treasure

FIVE years men worked whittling down mountains, excavating 100 million tons of earth and rock. And now—just in time to supply Uncle Sam's growing war needs—the treasure's been uncovered. A billion-dollar deposit of copper ore stands ready to be mined!

On this vast project at Morenci, Arizona, rubber tires designed by B. F. Goodrich stood up under almost unbelievable punishment. Giant dump trucks carried off 37 tons of mountain at a crack. Including truck weight, the big B. F. Goodrich Rock Service Silvertowns on many of the vehicles had to keep 55 *tons* rolling. And over jagged rocks, up steep grades, 'round hairpin curves.

Since the days of the old five-yard dump truck with its midget 40 x 8 dual tires, B. F. Goodrich research has played a leading role in the development of "tough job" tires for all the types of earth-moving equipment on which modern construction techniques depend.

America's oldest tire manufacturer now offers the construction industry a most complete line of tires—each designed not only to fit your wheels, but also to fit the conditions encountered on your particular job. Let the B. F. Goodrich man fit the tires to your job and each casing you buy will give you better service—*longer*. This way you will save money yourself while conserving rubber for Uncle Sam!

B. F. Goodrich hose, belting, accessories, and rubber footwear are value leaders, too . . . proved in use on construction jobs everywhere. To avoid inconvenience, to insure satisfaction . . . make B. F. Goodrich the one source of supply for all your rubber products requirements.

Free **TIRE GUIDE!**

Describes each off-the-highway tire in detail, tells the type of service it's designed for, and the type of equipment it's to be used on. Gives tips on tire care and maintenance that will help you conserve rubber and save money. For your *free* copy write The B. F. Goodrich Company, Akron, Ohio, *today!*

BFG
Earth Service Silvertown
The last word in surefooted traction. Jumbo cleats form a balanced, non-skid, self-cleaning tread design.
Rock Service Silvertown
Rugged, closely-knit tread resists cutting. The best tire for quarrying, strip mining, rock excavating.
Universal Super Traction Silvertown
Gives universal traction forward and backward. Extra-heavy tread and sidewalls for resistance to cutting.

In war or peace

B.F.Goodrich

FIRST IN RUBBER

Buckets S-T-R-E-T-C-H
and Last Longer
when you blast more effectively

One way—perhaps the only way today—to increase production is to get more work out of your present equipment. Make it stretch as far as possible, last as long as possible—because you can't count on getting immediate additions or replacements.

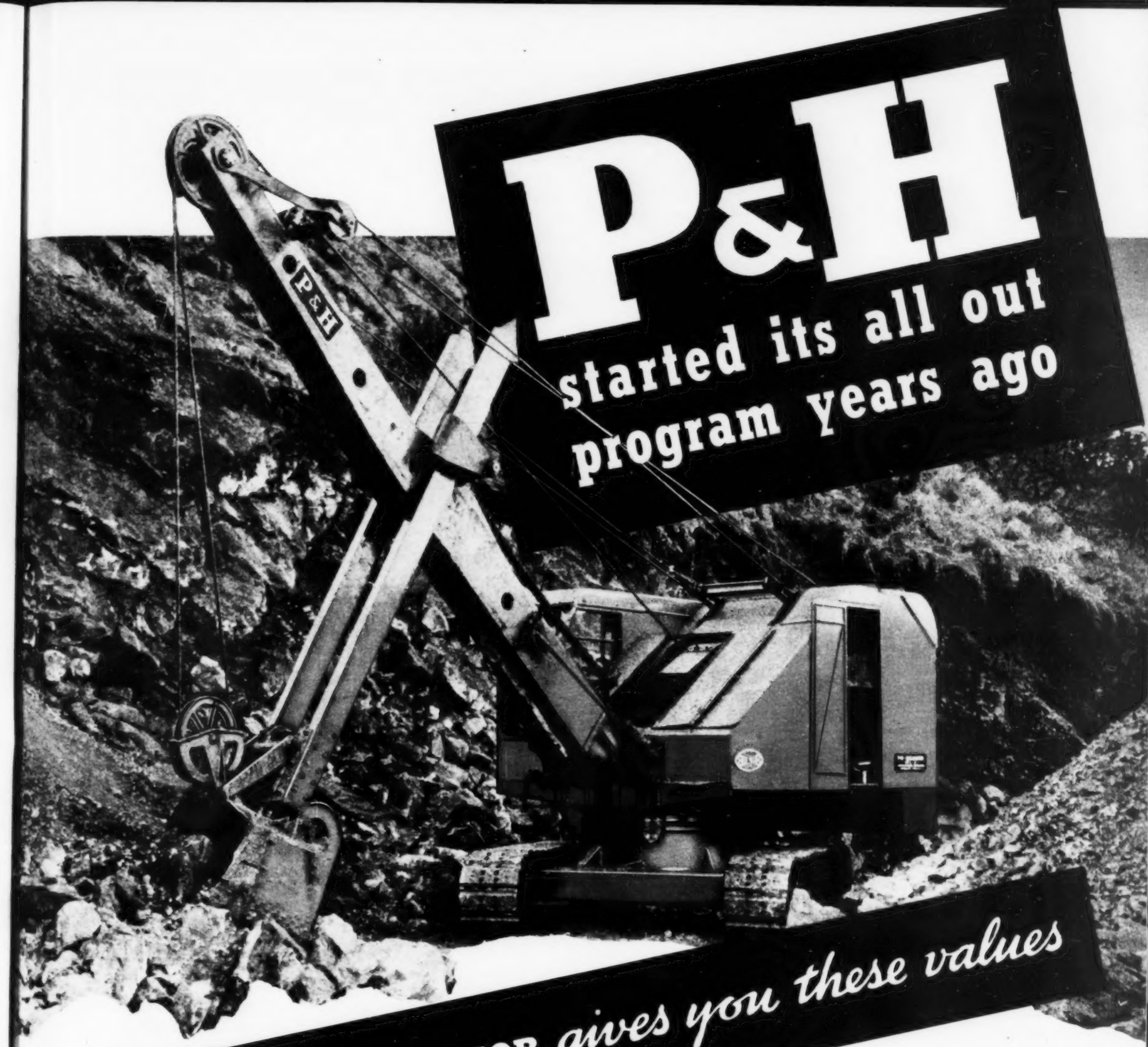
Good blasting is one of the most effective "bucket-stretchers" you can find. Use explosives right—use enough—but don't waste them.

Cooperating with explosives users, Atlas Technical Representatives have been able to help on many types of jobs. Perhaps, by helping with your blasting problems, they can make your equipment go farther.

ATLAS EXPLOSIVES
"Everything for Blasting"

CHEMICALS ATLAS EXPLOSIVES

ATLAS POWDER COMPANY, Wilmington, Del. • Offices in principal cities • Cable Address—Atpowco



NO OTHER EXCAVATOR *gives you these values*

All-welded construction of rolled alloy steels.

One-piece revolving frame with integral side stands.

One-piece lower with integral axles and crawler frames.

True tractor-type crawlers—*proved* for dependable travel.

Automotive hydraulic control for faster, smoother, easier operation.

General Offices: 4494 W. National Avenue, Milwaukee, Wisconsin

BE A STEP AHEAD WITH P&H

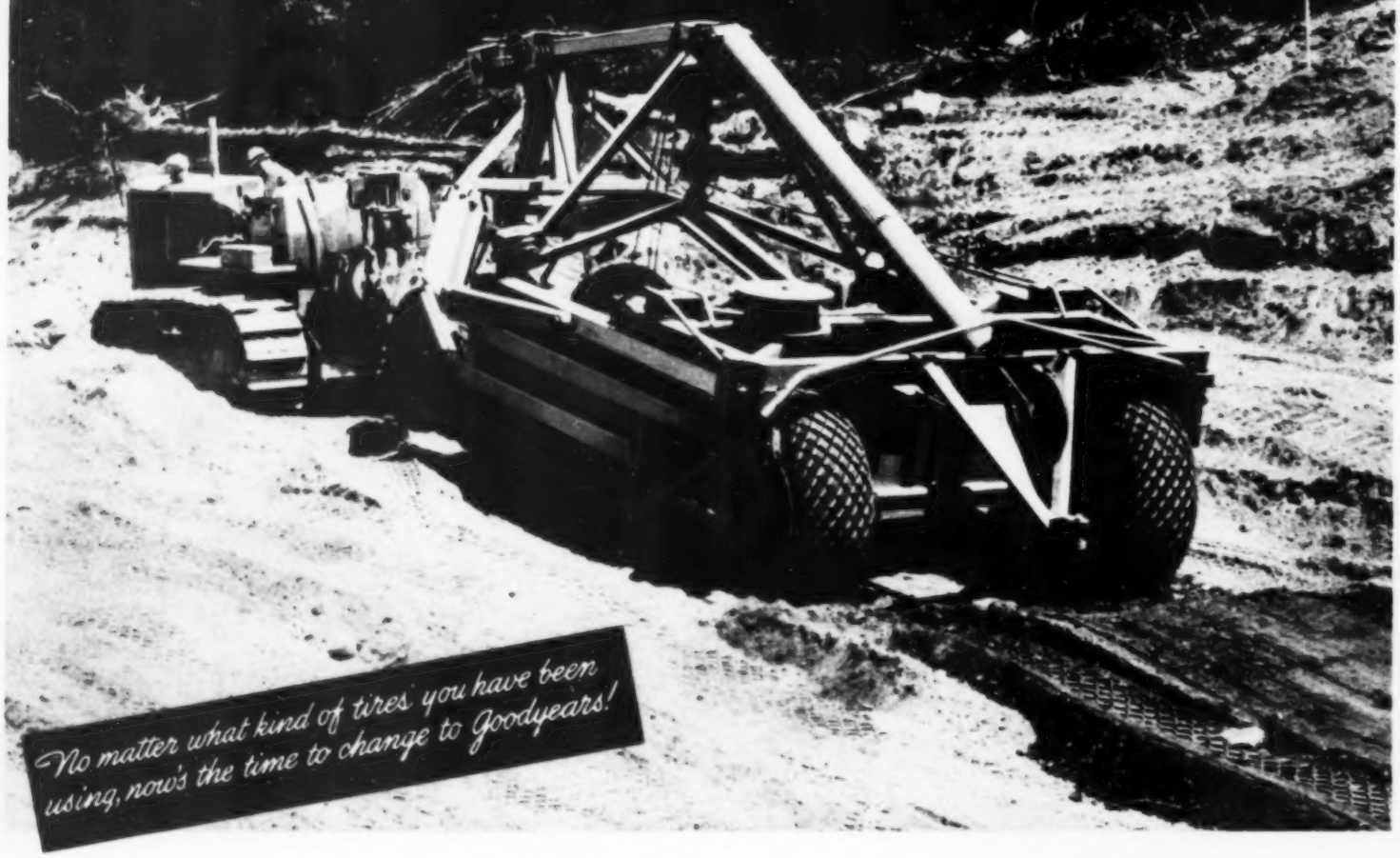
MORE *for your excavator dollar*

HARNISCHFEGER CORPORATION

EXCAVATORS • ELECTRIC CRANES • ARC WELDERS P&H HOISTS • WELDING ELECTRODES • MOTORS

IF YOU CAN BUY TIRES TODAY

Why not get the Best?



● We don't have to tell you that off-the-road vehicles are meeting tougher, more grueling schedules than ever before. And that, of course, means an extra burden on tires.

The three Goodyear huskies shown here are the stoutest, sturdiest tires you'll find anywhere.

You can check that with the judgment of contractors everywhere. *For more than twenty years they've hauled more tons on Goodyear truck tires than on any other kind.*

No matter what type of operation you're engaged in — rock, mud or sand — Goodyear makes the tire to fill your need. So pick out the one you want and put it to work today. Your Goodyear dealer is waiting to help you.

BEST PLACE TO GO FOR RETREADS

Goodyear dealers can arrange for retreading any make of off-the-road tire, up to the largest size — in the correct mold to assure a first-class job

All-Weather — T.M. The Goodyear Tire & Rubber Company

GOODYEAR TIRES

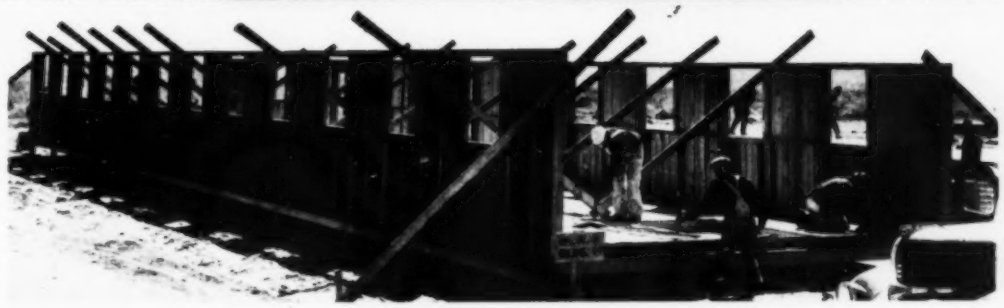
MORE TONS ARE HAULED ON GOODYEAR TRUCK TIRES THAN ON ANY OTHER KIND

Construction Methods

ROBERT K. TOMLIN, Editor

Volume 24 | MAY, 1942 | Number 5

PREFABRICATED WOOD PANELS, with openings for windows, to serve as walls of buildings at alien reception center in California are assembled flat, ready for erection. Camp site in Owens Valley is in shadow of Sierra Nevada Mountains.



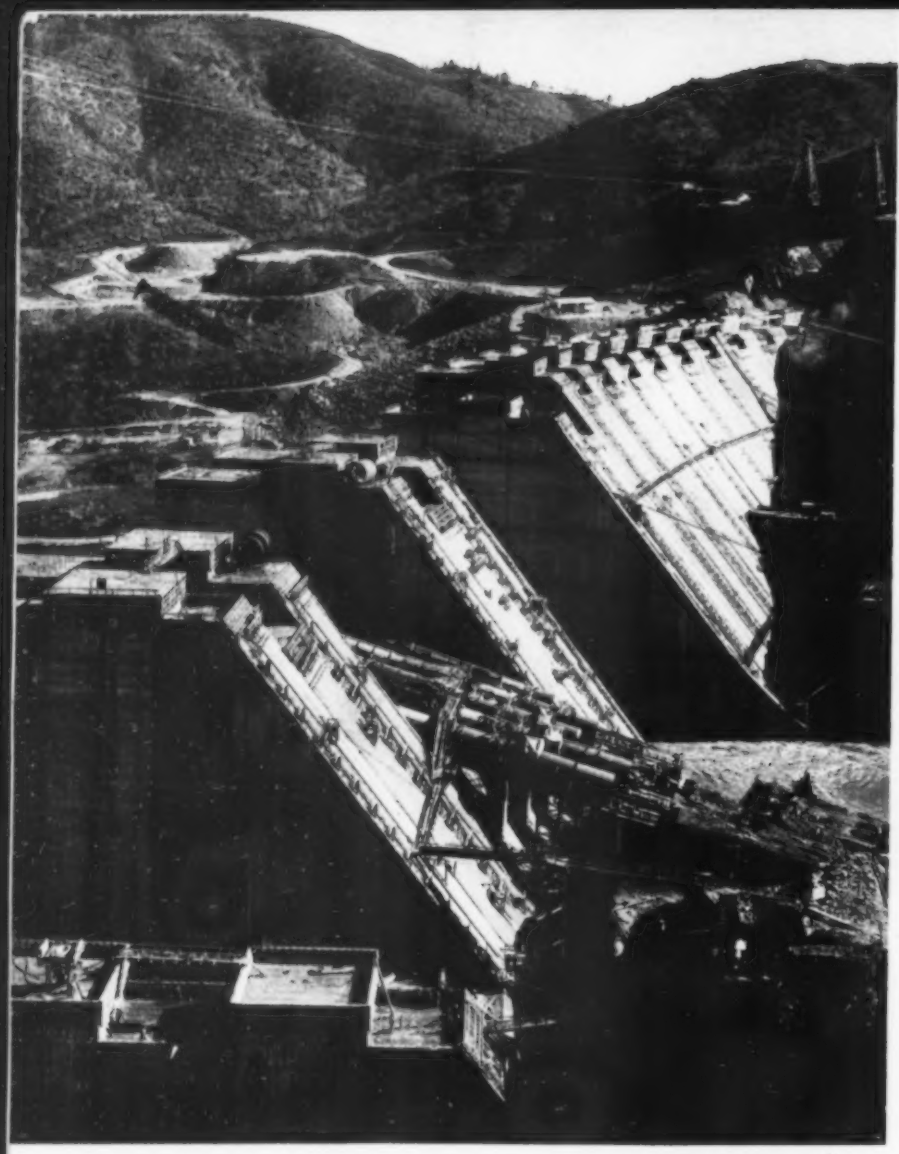
FIRST BARRACKS STRUCTURE (left), one of more than 350 similar units takes form at reception center on which construction is rushed to house Japanese evacuated from California coastal regions.

Wide World Photos

Build Reception Center for *Evacuated Japs* In California

FOLLOWING THE DECISION in March to remove from vital defense areas on the Pacific Coast, individuals of Japanese or other alien lineage, Lieut. General J. L. DeWitt, chief of the Army's Western Defense Command, under authority of an executive order of the President of the United States, took temporary possession of a 6,000-acre area at Manzanar, Calif., in the Owens Valley watershed of the Los Angeles Department of Water and Power, as the site for a "reception center" for evacuees from coastal localities where aircraft production, ship building and other industrial, military and naval activities are in full swing. A program of large-scale house construction was immediately undertaken, and the accompanying photographs indicate this work in its early stages to provide shelter for an initial population of 10,000. The project, including long wooden structures for living quarters, mess halls, bath houses and laundries, is being built under contract by the Griffith Co., under the direction of the U. S. Engineer Department.

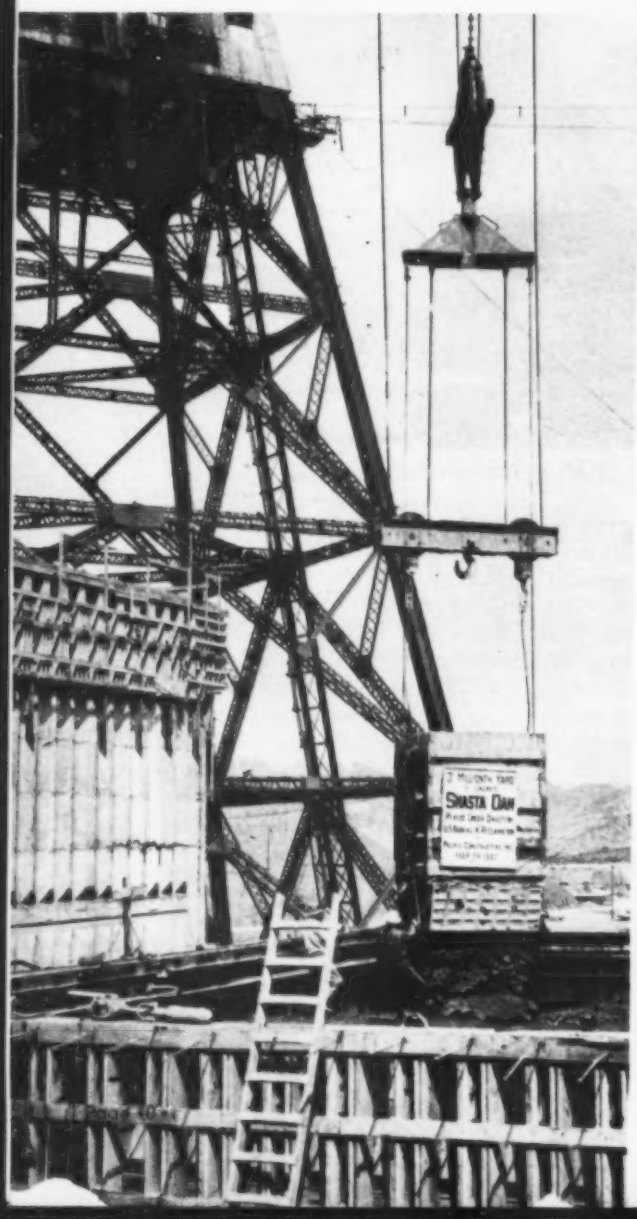
To speed construction, the contractor pre-cut all lumber with power-driven saws and assembled structural units before erection. The buildings are carried by concrete piers in the tops of which steel dowels serve to center 4x4-in. wood posts carrying 2x6-in. floor joists. Walls are built up of panels of 1x6-in. lumber, assembled flat on the floors of the housing units.



THIS MONTH'S NEWS REEL

RENAMED TO HONOR ARMY COMMANDER, recently transferred to direct Allied operations in Southwest Pacific from Australia after brilliant defense of Philippine's Bataan Peninsula, is former Conduit Road in Washington, D. C., now designated MacArthur Boulevard.

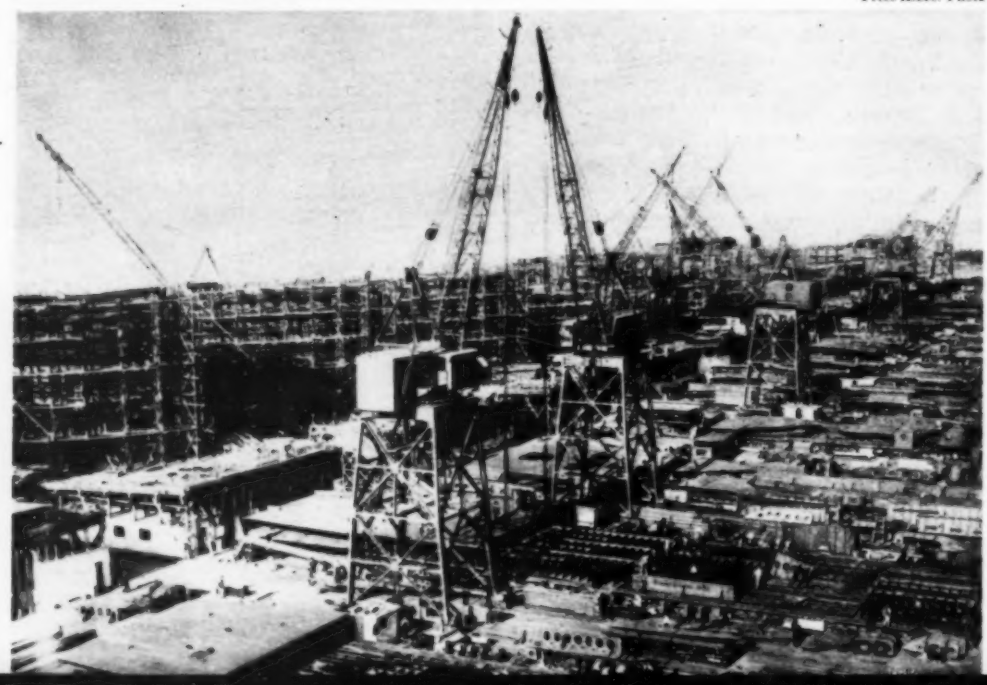
Press Assoc. Photo

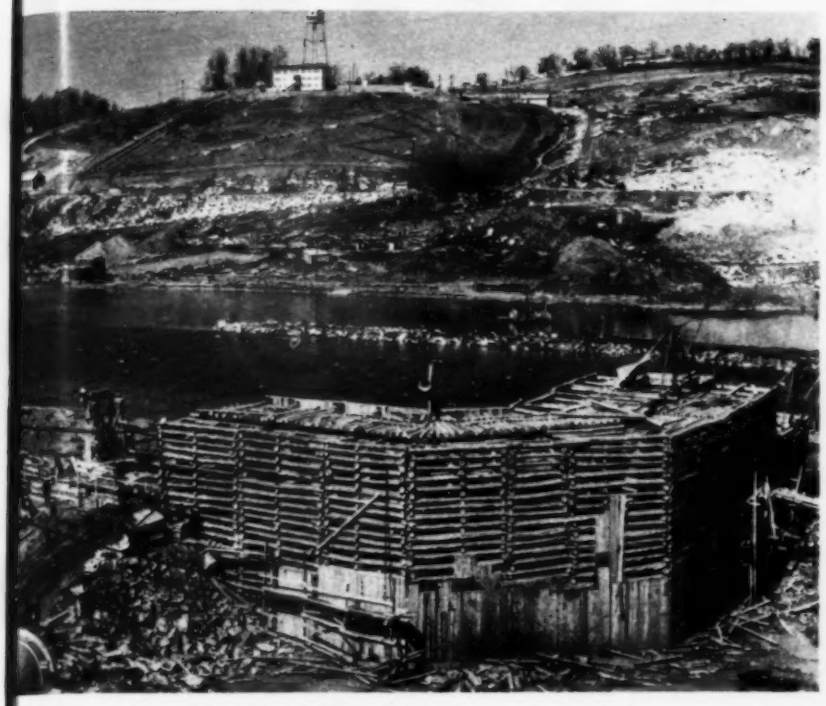


THREE MILLIONTH CUBIC YARD of concrete **(left)** is deposited by Pacific Constructors, Inc., March 28 in Shasta Dam **(above),** U. S. Bureau of Reclamation structure across Sacramento River in northern California. Completed dam, which will be 602 ft. high, will contain about 6,000,000 cu.yd. of concrete. View above across downstream face shows power penstocks being installed in west abutment section as river flows through open spillway section.

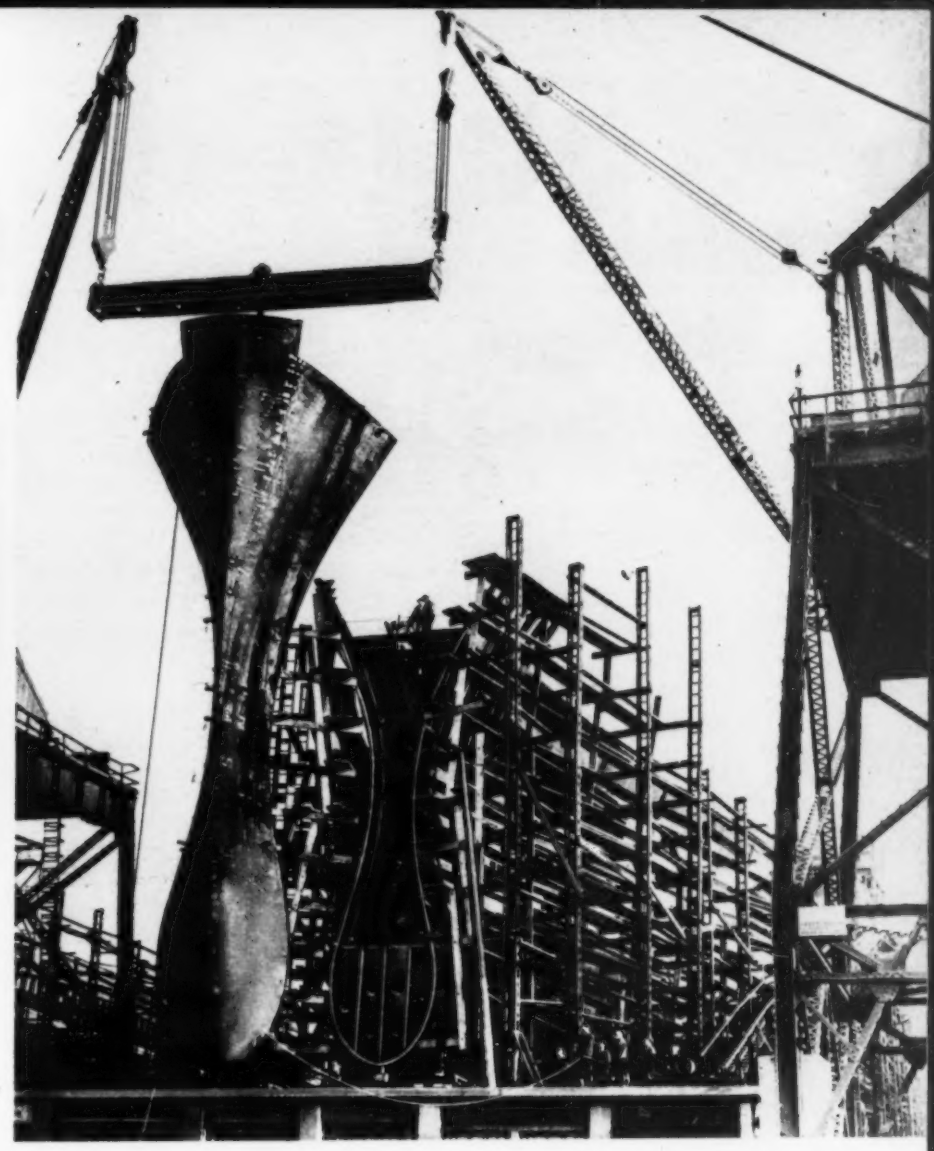
MULTIPLE SHIPBUILDING (below) proceeds apace at new yard, one of seventeen not in existence a year ago, "somewhere in the United States." Revolving cranes mounted on tall steel towers handle material for Liberty ships under construction on ways as welders, in foreground, fabricate large steel sections for hulls of cargo-carrying vessels.

Press Assoc. Photo





AT DOUGLAS DAM, Tennessee Valley Authority's wartime project on French Broad River, two months' progress is shown in this photograph of two log-crib cofferdams rising on either side of stream. On hilltop is engineer office and water tower. Dam, when completed, will be 160 ft. high and 1,780 ft. long.



HUGE WELDED BOW SECTION (right) for new tanker is erected on shipway of subsidiary of U. S. Steel Corp. Assembly of large hull units in shop constitutes one of modern methods of speeding up emergency ship-building program.

U. S. Steel Corp. Photo

Press Assoc. Photo

ALASKA HIGHWAY CONSTRUCTION is assured as Canada's Prime Minister Mackenzie King **(above, center)** signs agreement March 18 under which United States will build and maintain route extending from St. John, in British Columbia, to connect with Alaskan air bases. Construction crew **(below)** from U. S. Army Engineer units rushes construction of plank road near Dawson Creek to accommodate influx of new troops and supplies.

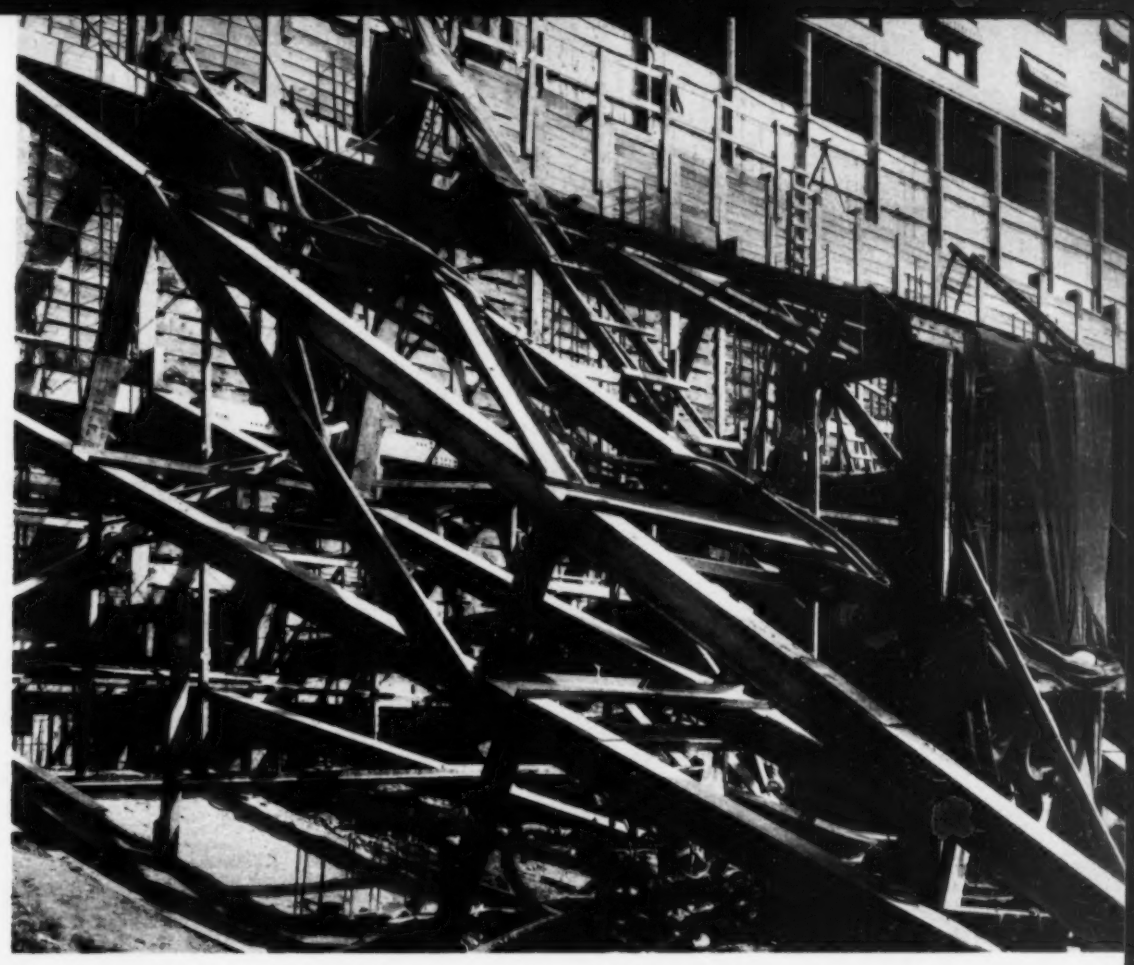
AT CHEROKEE DAM, one of Tennessee Valley Authority's wartime power projects, housing for first turbine is installed after only 13 months of construction. Workmen inclose speed ring column, which will hold turbine, in steel scroll case through which water will be conducted.

Wide World Photo

INCLINED STEEL SHORES extend from concrete supports in bottom of pit to brace retaining wall formed by H-beam piles, horizontal ranger beams, and wood plank lagging.

Gridsheet Bank Support Holds Sides of

GRIDSHEET SYSTEM (below) of supporting side of cut protects existing 11-story building. Steel H-beam piles, driven vertically on 8-ft. centers are spanned by horizontal steel rangers braced by inclined steel shores. All connections are welded. General depth of cut is 20 ft. except at boiler room, where 40-ft. depth is required.

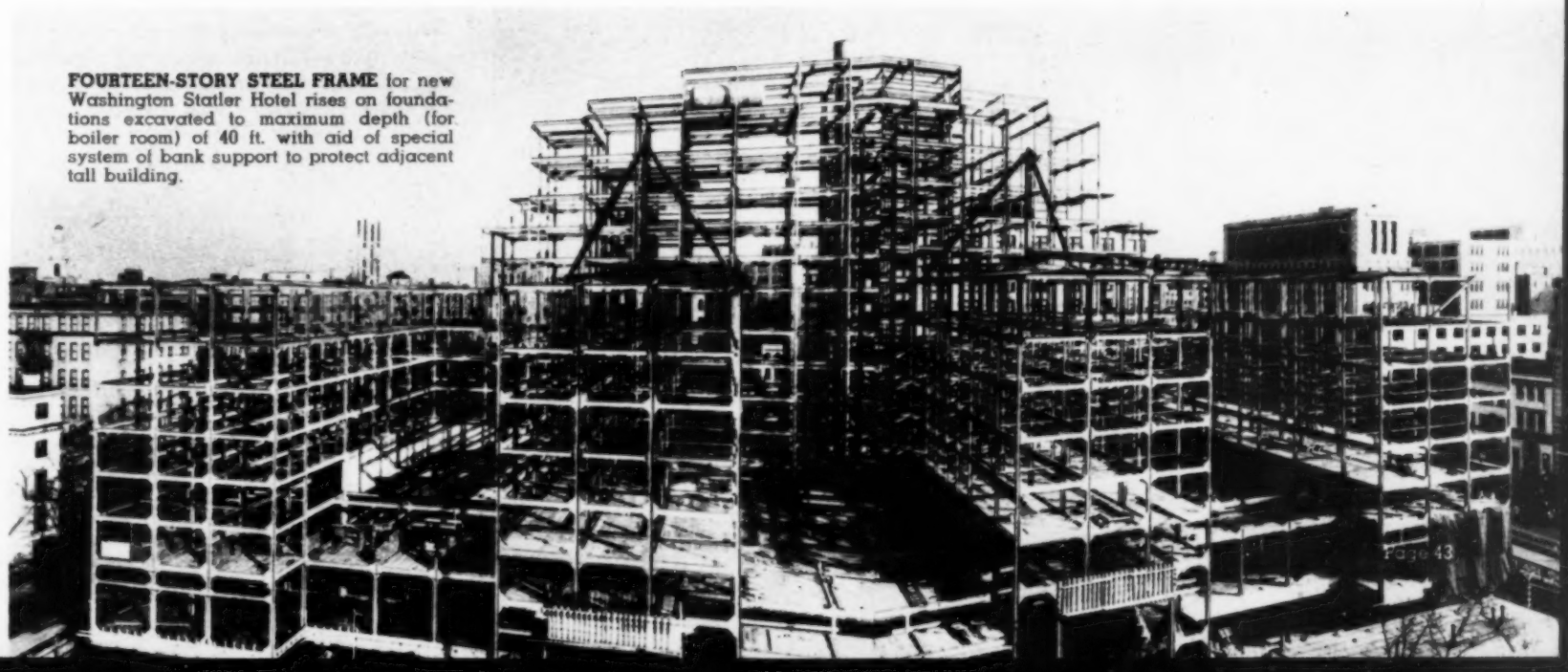


BRACING OF WALL at point 40 ft. below street level alongside 11-story building is done in multiple tiers by steel shores of I-beams and channels with welded connections. Note, at rear, horizontal timber laggng between steel H-beam piles.

Foundation Cut for New Washington Statler Hotel

By CHARLES B. SPENCER
Vice-President,
Spencer, White & Prentis, Inc.,
Engineers and Contractors,
New York, N.Y.

EXCAVATION OF 80,000 CU.YD. OF MATERIAL, principally blue clay, for the foundation of the new $8,500,000, fourteen-story Statler Hotel, being completed to provide 1,000 rooms for guests seeking accommodations in overcrowded Washington, D.C., was done with the aid of a "gridsheet" system of bank support to protect an existing 11-story building only 18 ft. distant from the east side of the cut. To retain the earth along the side of the pit as digging was carried to a maximum depth (for the boiler room) of 40 ft. below street level, heavy steel H-beams were driven vertically into the ground on 8-ft. centers and the space between them was lagged with 3x10-in. horizontal planks, forming a wall along which steel ranger beams were set horizontally against the vertical H-beams and braced with inclined steel



FOURTEEN-STORY STEEL FRAME for new Washington Statler Hotel rises on foundations excavated to maximum depth (for boiler room) of 40 ft. with aid of special system of bank support to protect adjacent tall building.

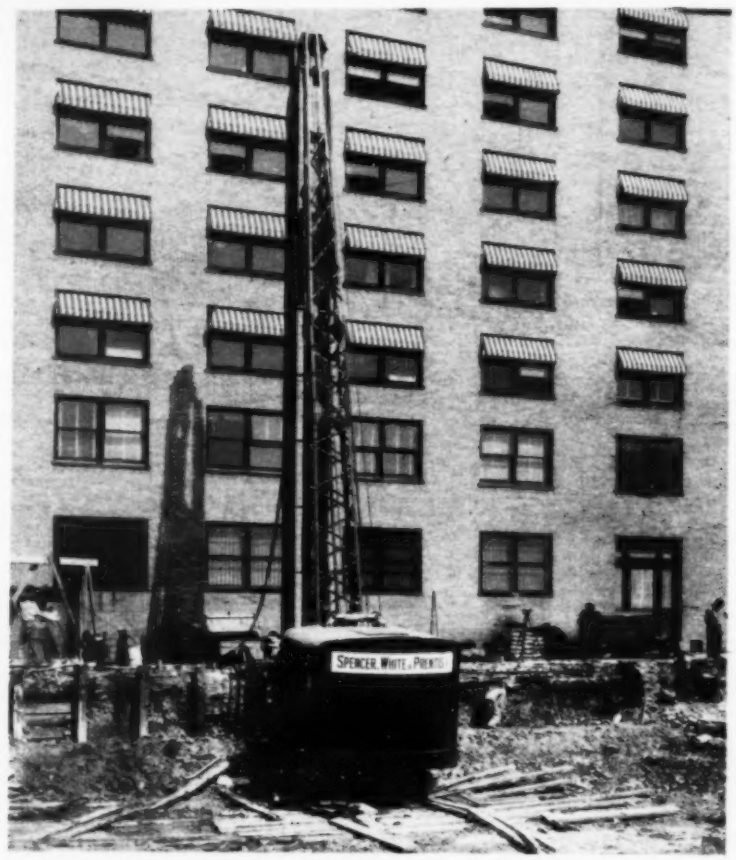
EXCAVATION FOR SUBSTRUCTURE is begun on 65,000-sq. ft. site with three diesel-powered shovels and clamshell crane. At distance of only 18 ft. from east side of cut, at right, 11-story building had to be protected by system of bank support as excavation was carried to basement grade.

To excavate to the various levels for the basement and boiler room required the removal of approximately 80,000 cu.yd. of material. With three large diesel-powered shovels and a fleet of 60 trucks, this yardage was handled in two months. Such material as could not be reached by the shovels was removed by clamshell buckets operated from cranes. Throughout the excavation a tractor-bulldozer was continually in operation to keep access roads level and push large quantities of material to within reach of the clamshells and shovels.

Steel H-Beams Driven—Along the east side of the premises a narrow alley was the only access to a garage under the Investment Building alongside, and had to be maintained.

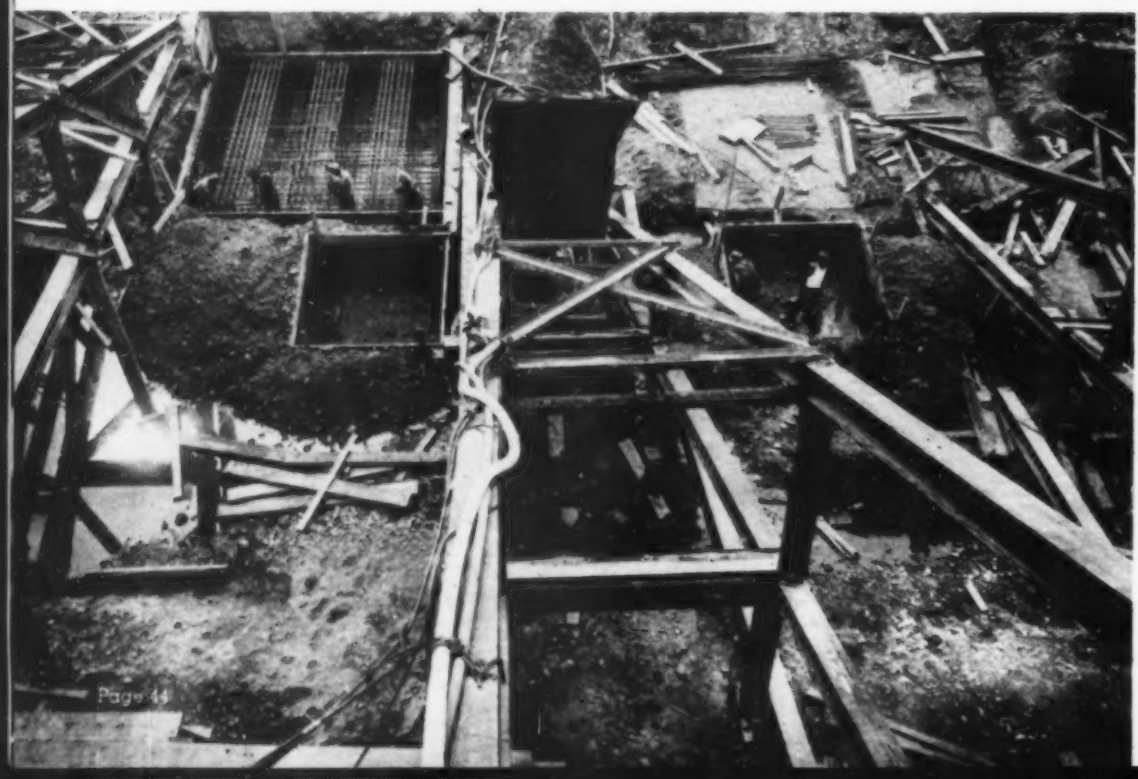
shores extending to concrete supports below basement grade. The steel-frame hotel structure, located at 16th and K Sts., has a volume above street level, of 5,000,000 cu.ft.

The new Washington Statler Hotel has a good foundation carefully planned not only as to the final result, but also as to manner of execution. Borings disclosed that under the top few feet of loam and fill the site was underlain with blue clay to a depth of about 30 ft. While such material normally furnishes adequate bearing, in this case the clay varied greatly in hardness. Some of the samples were almost as hard as rock while others could be squeezed through the fingers like putty. Furthermore, while only a single cellar about 20 ft. deep was required over most of the area, the boiler room required an additional 20 ft. of depth. At this level the foundation would be in coarse gravel, so it was decided to carry all the foundations to this material. This decision was insurance that there would be no cracking in the building due to the foundation bearing on different types of material.



PILEDRIVER RIG puts down steel H-beam piles, on 8-ft. centers along east side of cut.

STEEL REINFORCEMENT (below) is set in excavation for one of concrete piers that will carry columns of big steel-frame hotel structure. In foreground are steel members of shores that brace sidewall of cut.



Ordinary sheetpiling was deemed inadequate to afford the necessary protection, and a method known as the Pretest Gridsheet system was decided upon. Heavy H-beams were driven from the surface to penetration in the gravel. The beams were on about 8-ft. centers and were 35 ft. long, except along the boiler room where 45-ft. beams were required. As the excavation progressed, horizontal boards 10 in. wide and 3 in. thick were set between the beams to hold back the earth. Spaces of 2 in. were left between the boards so that material could be rammed in to prevent any loss of ground.

When the excavation had progressed

(Continued on page 101)

Prestressed Steel Bands

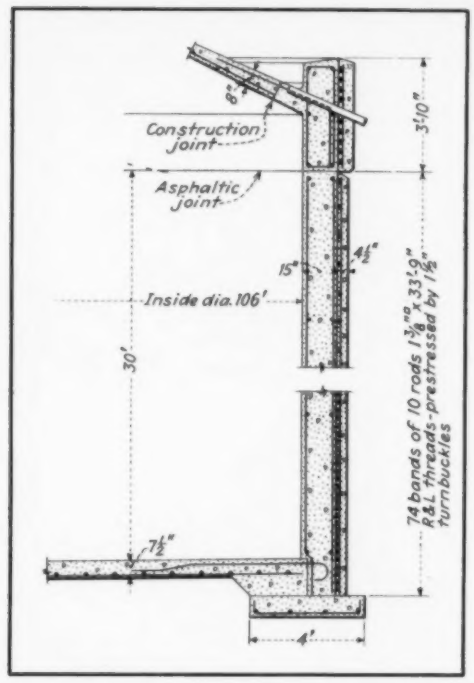
Reinforce Circular Concrete Reservoirs With Domed Roofs

TWIN CONCRETE RESERVOIRS with domed roofs, each of 2,000,000-gal. capacity, are replacing an uncovered reservoir that has supplied water to Council Bluffs, Iowa, for several years. One of the reservoirs has been completed by the Work Projects Administration and is in use, while on an adjacent hill construction is in progress on the second concrete structure. When completed, both tanks will be 236 ft. above the level of the town, maintaining a pressure of 85 to 90 lb. per sq.in. throughout the business district.

The tanks have an inside diameter of 106 ft., with a height to overflow of 30 ft. and a dome rise of 13½ ft. The specifications call for vertical joints in the walls and definitely exclude horizontal joints, making this type of construction similar to a barrel. Prestressed steel bands in the wall, placed around a first thickness of 15 in. of concrete and covered with 4½ in. more on the outside, make a 19½-in. wall in which tension in the concrete is eliminated, according to project engineers.

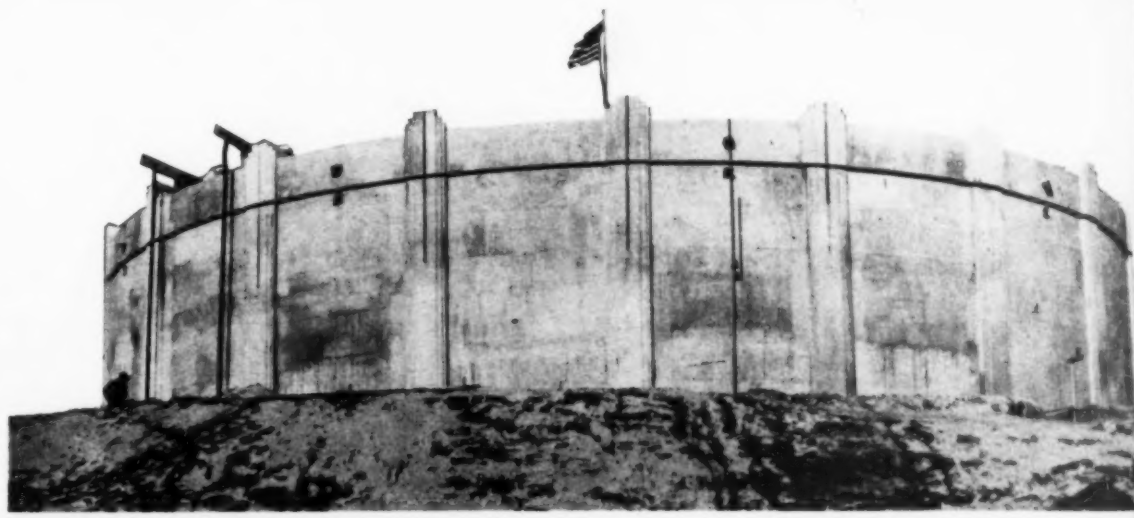
In construction of the first tank, 15

(Continued on page 122)



CROSS-SECTION of wall of circular concrete reservoir shows location of steel bands, prestressed by turnbuckles for circumferential reinforcement.

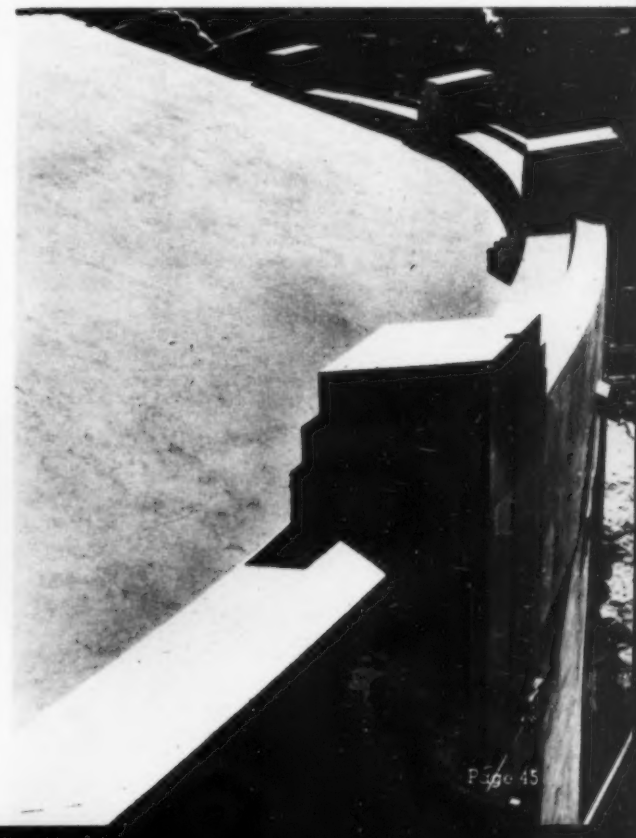
CIRCUMFERENTIAL REINFORCEMENT for circular wall of reservoir consists of rings of 1⅜-in. circular steel rods, prestressed by turnbuckles.



CIRCULAR CONCRETE RESERVOIR of 2,000,000-gal. capacity, one of pair atop hill at Council Bluffs,, Iowa, has inside diameter of 106 ft. and is covered by domed roof.

DOMED CONCRETE ROOF (below), with rise of 13½ ft., covers reservoir which has inside diameter of 106 ft. and height, to overflow, of 30 ft.

WOOD FALSEWORK is erected to support forms for domed roof of circular concrete reservoir. Sidewall of structure is reinforced by prestressed steel bands.



MISSISSIPPI RIVER BRIDGE to carry U. S. 20 between Dubuque, Iowa in foreground, and East Dubuque, on Illinois side of river, has 42 piers and two abutments constructed on timber pile foundations to support open structure 5,760 ft. in length.

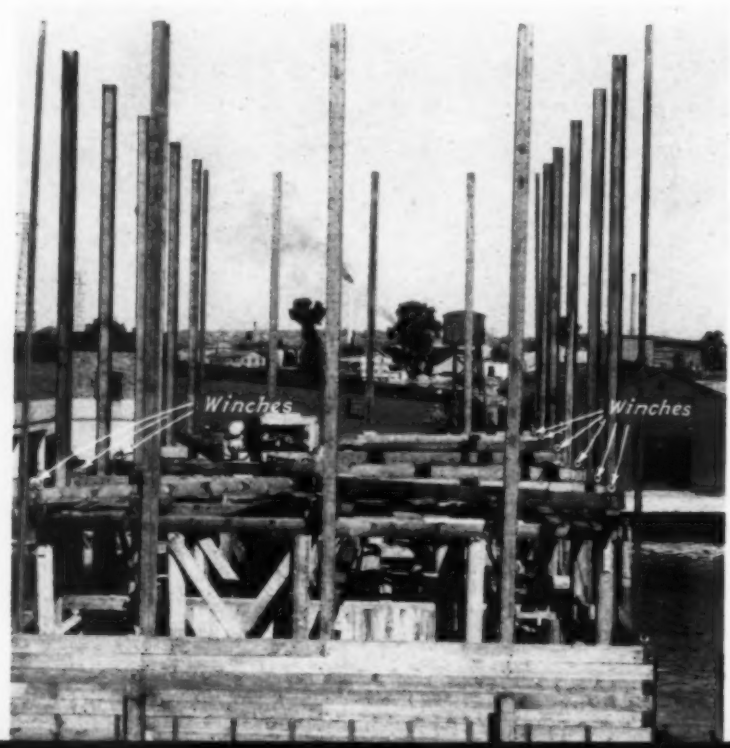
CRANE PILEDRIVER equipped with adjustable leads handles steam hammer and combination air-and-water jetting outfit used in putting down vertical and batter piles for pier foundation on east side of Mississippi River.

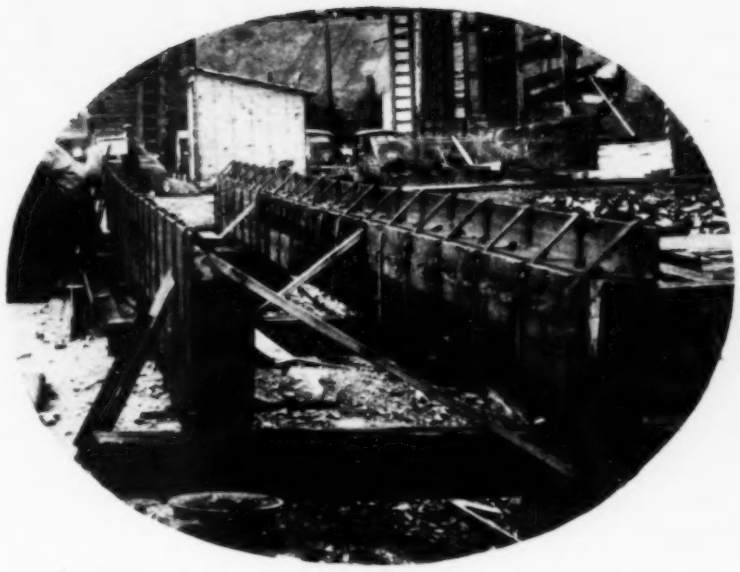
Well Points, Pile Jets and Crib Cofferdams Serve Builders of *Bridge Piers*

IN CONSTRUCTING 42 PIERS and two abutments of a new 1.1-mi. highway bridge to carry strategically important U. S. 20 across the Mississippi River at Dubuque, Iowa, the Ferd J. Robers Construction Co., Burlington, Wis., and the La Crosse Dredging Corp., Minneapolis, Minn., substructure contractors, made effective use of three construction methods particularly adapted to conditions encountered at the site. In low land on the east, or Illinois, side of the river, well-point systems lowered groundwater level at the locations of seven piers and eliminated need for cofferdams. Throughout the length of the bridge, high-pressure air-and-water jets made

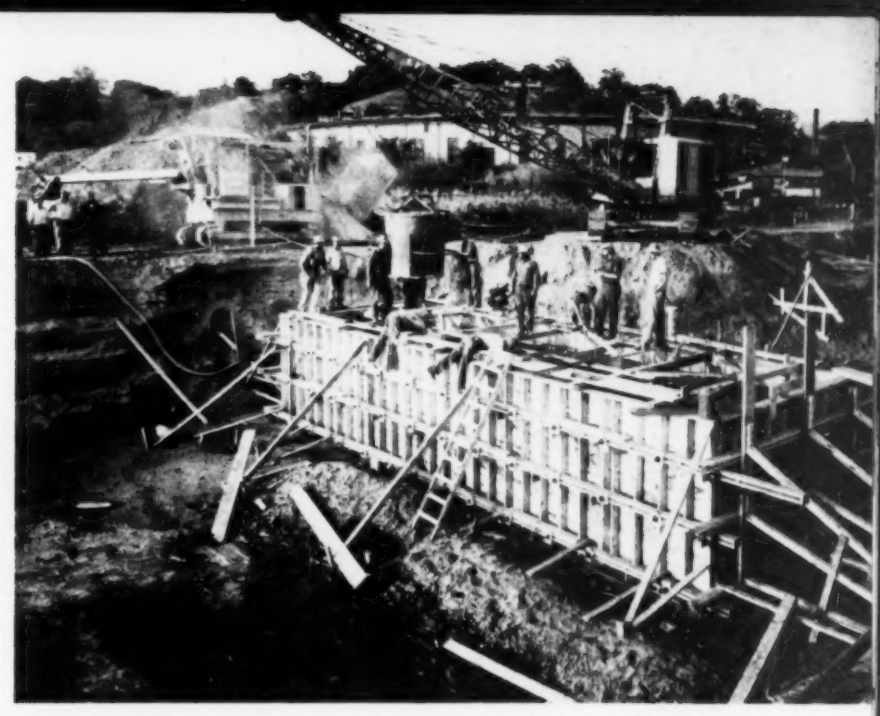
SUPPORTED BY CABLES (below) from hand winches on falsework staging, timber crib with inside dimensions 75½x43 ft. is assembled at deepest pier. Walls above steel cutting edge consist of 10x12-in. timbers in horizontal courses tied together by drift pins and bolted to steel corner angles and vertical H-section members.

TWO LINES OF WELL POINTS hooked up to Moretrench pumps, drain trench excavated through line of piers in low land on east side of river, eliminating need for cofferdams. Spoil from trench builds embankment for construction road. Piers are excavated to footing grade, and piles are driven and cut off in preparation for placing concrete in dry.





CUTTING EDGES for timber cribs are fabricated on shore by bolting and strapping steel angles to two bottom courses of wall timbers.



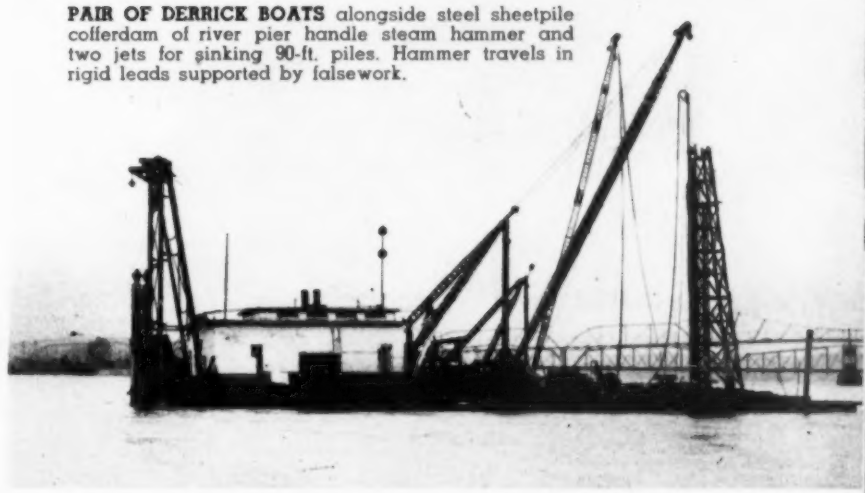
PAVING MIXER turns out 1-yd. concrete batches which are placed by crane-handled bucket in forms of pier footing.

it possible to sink timber piles for the substructure units through sand and gravel substrata; two jets were employed at the river piers for piles up to 95 ft. long. To inclose the bases of the two main piers, in which concrete is placed to depths of 57 and 37 ft., respectively, below pool level in the river, the contractors utilized timber crib cofferdams adopted from construction plans proposed by Howard, Needles, Tammen & Bergendoff, of Kansas City, Mo., designing and supervising engineers for the project.

Features of Bridge — Because the long east and west approaches of the bridge elevate the highway above 31 intersecting railroad tracks, the project received $750,000 of federal funds from Iowa and Illinois for grade-crossing elimination. The west approach, made up of seventeen girder spans with a total length of 1,450 ft., crosses above 25 tracks in Dubuque, and the Illinois approach, comprising 23 girder spans with an overall length of 2,770 ft., clears six tracks in East Dubuque. Required additional funds for construction of the new bridge and for purchase of an existing privately owned toll bridge were raised through sale of bonds by the City of Dubuque Bridge Commission, created by act of Congress to carry out the project.

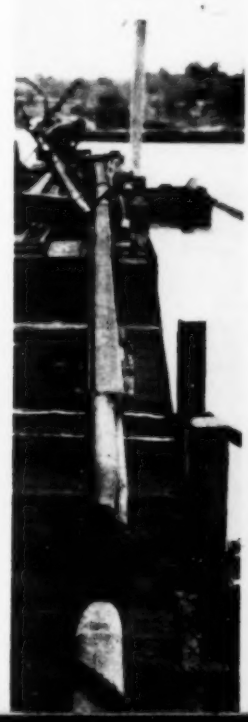
Total cost of the new bridge, exclusive of $400,000 paid for the old bridge, is about $3,150,000. The substructure

PAIR OF DERRICK BOATS alongside steel sheetpile cofferdam of river pier handle steam hammer and two jets for sinking 90-ft. piles. Hammer travels in rigid leads supported by falsework.

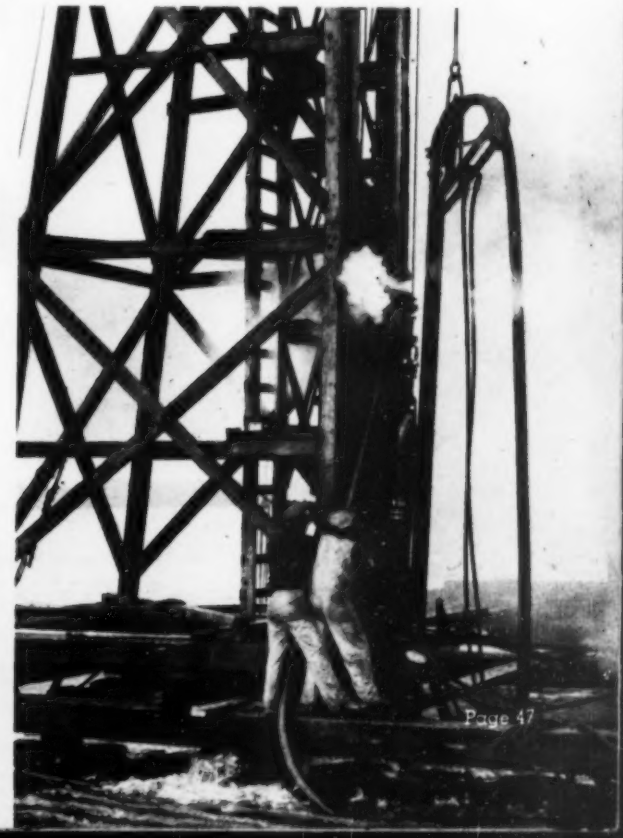


TWO JETTING OUTFITS (below) used in sinking long piles are raised and lowered by lines hung from booms of two derrick boats. Heavier boom at right also handles heavy steam hammer traveling in rigid leads.

COMBINATION JET (below) consists of 3-in. water pipe nozzled to 1½-in. and 1¼-in. air pipe reduced to ¾ in. at nozzle.



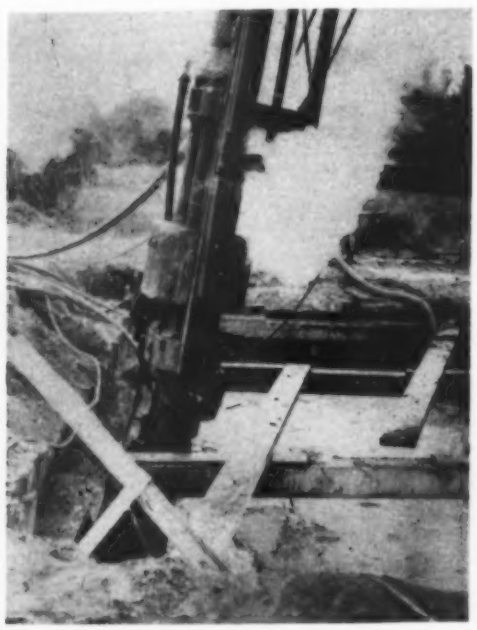
TWO COMBINATION JETS (below) delivering pressure streams of air and water operate in conjunction with 6½-ton single-acting steam hammer to sink 90-ft. fir pile through sand and gravel strata in bed of river. Flood raises river level close to top of steel sheetpile cofferdam.



WITH EXHAUST HOSE connected for underwater operation, steam hammer continues driving pile under surface of river while two jetting outfits are worked up and down around pile to loosen sand-gravel material and aid penetration. River is at flood stage, 6 ft. above pool.

AT SHORE PIER on west side of river, crane piledriver picks up 65-ft. creosoted pile to be installed in pier foundation.

USING PEAVEY, workmen set pile in leads at proper location for driving in pier footing, excavated inside timber-sheeted cofferdam.



SINGLE-ACTING STEAM HAMMER with striking part weighing 3,000 lb. completes final driving of batter pile close to wall of wood-sheeted cofferdam for pier footing.

CONSTRUCTION is directed by IVAN P. HANSON (left), resident engineer for Howard, Needles, Tammen & Bergendoff, designing and supervising engineers, and FRANK P. SKIBBIE, superintendent for Ferd J. Robers Construction Co. and LaCrosse Dredging Corp., substructure contractors.

JETTING UNIT alongside pile works down into sand and gravel substrata and loosens materials for penetration by pile under hammer blows.

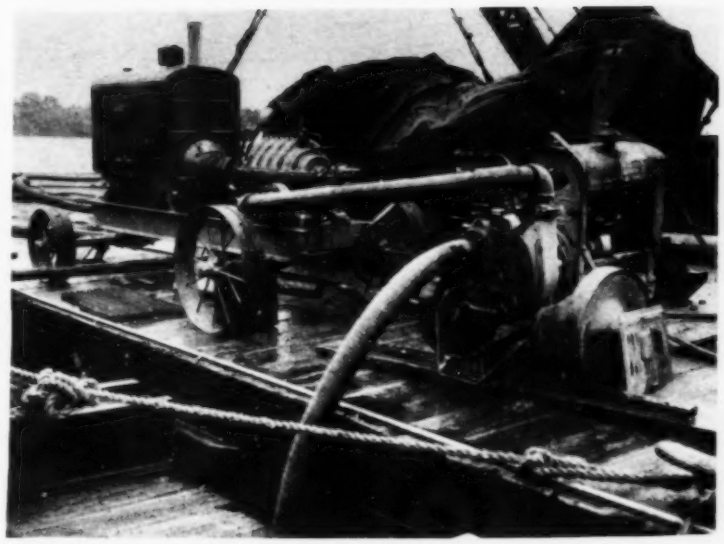
WITH PILES CUT OFF (below), bottom of typical pier footing is cleaned up and reinforcing steel is placed in preparation for concrete.

BOTTOM-GATE BUCKET (below) deposits concrete in cone-shaped hopper and spout making final pier pour in column tops and cross strut.

contract is valued at $832,000, and the superstructure contract, awarded to the Bethlehem Steel Co., at $1,588,000. The latter contract includes all steelwork and a concrete deck for a 24-ft. roadway with a 5-ft. sidewalk on one side and an 18-in. walkway on the other. Over the main river crossing between the long east and west approaches is a continuous three-span truss unit incorporating an 845-ft. channel span of combination tied-arch and cantilever design between two 347-ft. side spans. Utilizing the side spans as anchor arms during erection, the arch trusses of the main span will be erected by cantilever methods prior to the erection of the remaining steel, including the tie members.

Piers for the bridge are two-shaft concrete units rising from footings or

(Continued on page 92)

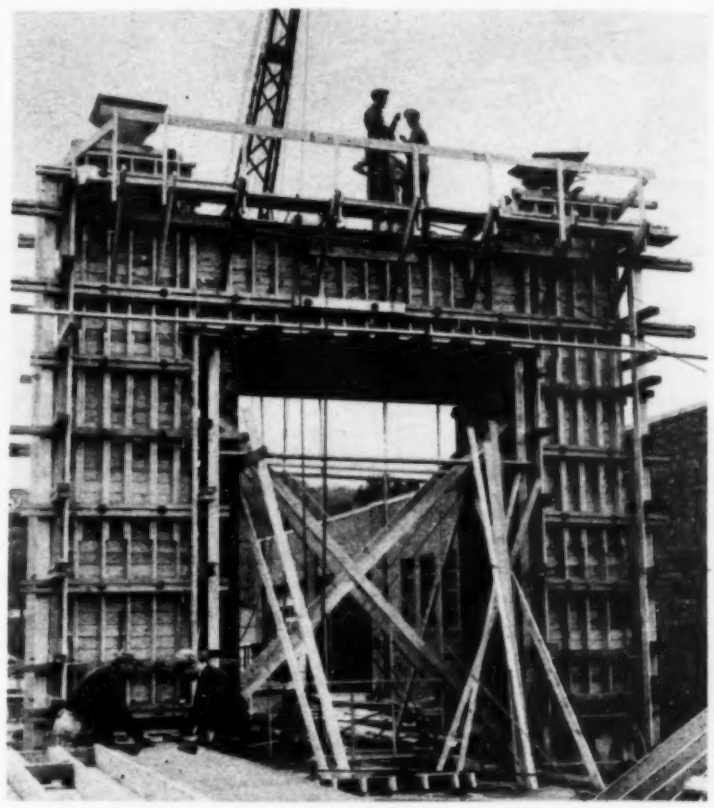


FOUR-STAGE CENTRIFUGAL PUMP, to which water is supplied by smaller unit at right, furnishes high-pressure stream to one jetting outfit.

DIESEL-POWERED COMPRESSOR delivers air through pair of hose lines to air jet of combination jetting unit.

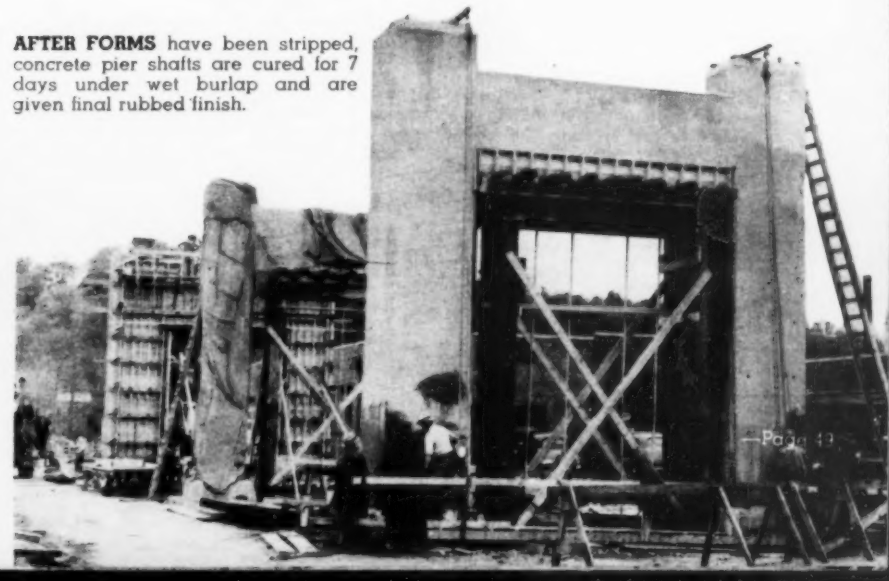
TWO TYPES OF VIBRATORS, air-driven (left) and gasoline-powered (right), consolidate dry concrete in pier forms.

75-FT. BOOM enables crane to erect false-work and forms and to place concrete from buckets in tall piers rising from foundations in low land on east side of river.



PLYWOOD LINING is applied to all forms used for exposed concrete surfaces; carpenters in foreground are lining form panel.

AFTER FORMS have been stripped, concrete pier shafts are cured for 7 days under wet burlap and are given final rubbed finish.



IMPROVED EQUIPMENT BUILDS Monolithic Brick Pavement

CUTTING SUBGRADE to cross-section profile for concrete base of second lane, traction treads of subgrading machine travel on road forms and on steel angles protecting inner edge of completed lane. Side conveyor casts spoil across brick stack covered with burlap on outer face, hidden from view.

DEVELOPMENT AND APPLICATION of monolithic brick pavement design by the Ohio Department of Highways in the last five years has led to invention and improvement of equipment for this type of construction, exemplified in most recent form on a 3.4-mi. section of U.S. 21 completed south of Barberton last fall by the Lewis & Frisinger Co., contractor, Ann Arbor, Mich. On this job, the vibrating machine used to embed the brick of the wearing course in the plastic concrete of the base was equipped with full-floating steel vibratory pads which accommodated themselves to the transverse profile of the surface, passing from crowned to plane sections without adjustment. Behind the vibrating machine, a side-discharge truck mixer distributed grout to fill the joints in the monolithic brick surface, eliminating the need for a traveling bridge with small concrete mixer employed for this purpose on former jobs such as the one described in *Construction Methods*, Feb. 1939, p. 42.

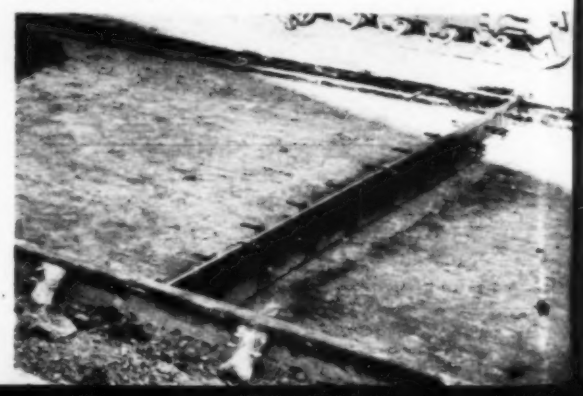
Except for ½ mi. on old alignment at the south end of the job, all of the pavement on the 3.4-mi. contract is on new location. The brick-surfaced pavement is 24 ft. wide, on

CONCRETE BASE for second lane is mixed and placed by 27E paver operating on completed pavement. Tank trucks supply water to paver. Two finishing machines strike off concrete and impart surface finish to base.

TWO VIBRATORS mounted on front screed of first finishing machine vibrate concrete on second pass of machine, when screed strikes off upper course of concrete covering reinforcing steel. Vibrators are not operated during first pass of machine, when adjustable blade on screed spreads lower course of concrete to receive reinforcing mat.

MONOLITHIC BRICK SURFACE (below) is constructed in three operations: **(1)** laying brick on plastic concrete of base, **(2)** embedding brick in concrete with vibrating machine and **(3)** filling brick joints with sand-cement grout distributed by side-discharge truck mixer.

PREMOLDED FILLER (below) of expansion joint for concrete base is set 1 in. low, with temporary metal cap on filler to keep top 1 in. open for later insertion of upper part of joint extending into monolithic brick surface.



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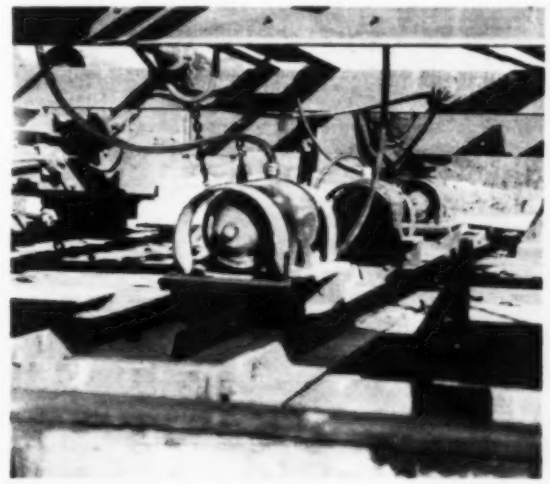
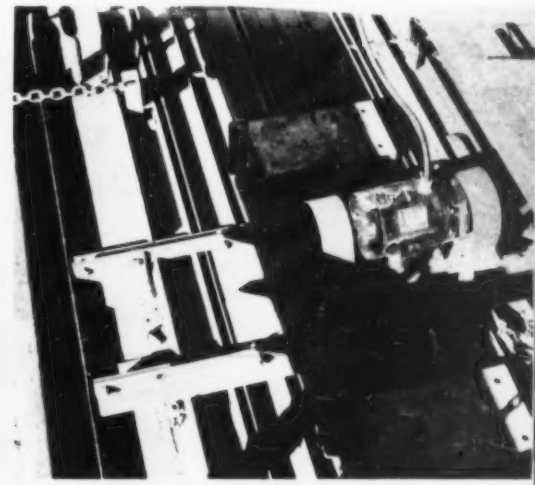
VIBRATING MACHINE carries vibratory unit made up of series of longitudinal steel channels which are lowered on to pavement surface to vibrate brick. At edge of pavement, wheels of self-propelled machine travel on upper form added to base form for brick wearing course construction.

MOBILE GRAVITY CONVEYOR delivers brick to two droppers laying courses from center line of pavement to outer edge of 12-ft. lane. Ribbon filler for longitudinal center-line joint is placed against completed brick pavement of first lane.

MONOLITHIC BRICK PAVEMENT is constructed under direction of: (left to right) C. J. CARROL, superintendent, Lewis & Frisinger Co., contractor; L. L. LUKE, project engineer, and WILLIAM M. WARDMAN, assistant division engineer, Ohio Department of Highways.



TRANSVERSE CHANNEL at center of vibratory unit carries three vibrators which impart vibrations to longitudinal channels resting on brick surface.



BOLTED CONNECTIONS to welded angles on outer longitudinal channels fasten transverse channel to vibratory elements in contact with pavement. Tie-rods through upstanding flanges of longitudinal channels connect them into vibratory unit.

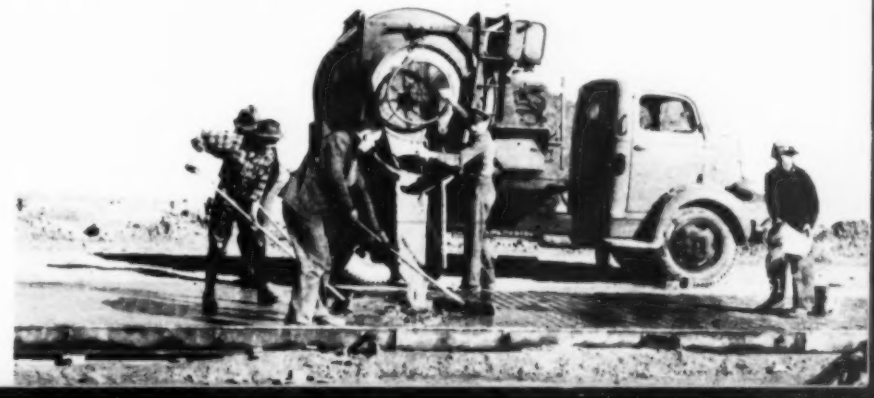
reinforced concrete base of 9-7-7-9-in. cross-section. This pavement was built in two 12-ft. lanes, with a construction joint between them. For one stretch of 1,260 ft., the brick pavement has lip curbs on both edges, constructed with special wedge-shaped brick. Similar brick lip curb construction is employed for a distance of 4,400 ft. at the upper edge of one superelevated curve. At the lower edge of this curve and of one other superelevated curve on the job, a concrete combined curb and gutter 2 ft. wide is added to the pavement. For vibrating the special wedge-shaped edge brick simultaneously with the rest of the pavement, the outside vibratory pad of the vibrating machine was adjustable to the slope of the lip curb.

Doweled ¾-in. expansion joints made up with premolded bituminous fiber filler were installed in the pavement on 120-ft. centers. The fiber filler, placed in two lifts (one for the base and one for the wearing course), extended to within 1½ in. of the brick surface and to within 1½ in. of each edge of the brick pavement. Hot-poured Rai-Seal rubber compound was used to seal the 1½-in. opening at the top of the joint and at each edge of the brick pavement. A keyed construction joint was formed in the concrete base between the two 12-ft. lanes, and the lanes were tied together with hook bolts installed on 5-ft. centers. The longitudinal center-line joint was extended upward into the brick surface by inserting

(Continued on page 104)

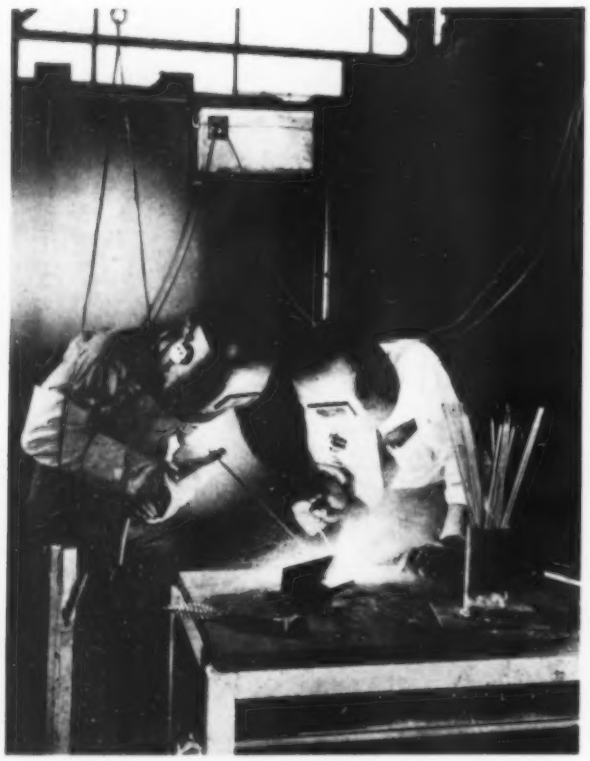
VIBRATORY UNIT of vibrating machine rests its full weight on pavement surface. Hangers and lateral ties serve only to move unit forward and keep it in alignment as self-propelled machine advances.

SAND-CEMENT GROUT (below) to fill joints of vibrated brick wearing course is spread on wetted surface by side-discharge truck mixer. Workmen with wooden screeds move grout into joints.



JOB oddities

LONGEST HAND-LIFT TRUCK ever built is claimed to be this Yale & Towne unit designed to handle Johns-Manville wall board and roofing on 168-in. long platform here shown supporting 17 men. Thus is topped by one man that other famous load in Treasure Island of "16 men on a dead man's chest."



TALKING HELMETS are worn by instructors and apprentice welders during training course at plant of Caterpillar Tractor Co. While arc sputters and heads of teacher and pupil are masked, telephone connection enables instructor to transmit advice on length of arc, angle of electrode and other details of welding technique through one-way transmitter to receiver under trainee's helmet.

TRAFFIC CONTROL DURING BLACK-OUT is aided by amber-colored flashlight baton in hand of member of 31st Engineers at Fort Belvoir, Va. On shoulders of military traffic officer are lights showing red in front and green on sides, so that traffic is started or stopped as soldier executes right or left face.

VICTORY HAIRCUT is sported by U.S. Army soldier **(top)** sent to Western Canada on project of constructing Alaska Highway. To protect heads during sub-zero temperatures in Northwest **(below)** men are equipped with overall helmets.

TAKEN FOR A RIDE is this span of steel railroad bridge rendered useless at its original site by rising waters of reservoir formed by Grand Coulee dam, U. S. Bureau of Reclamation project on Columbia River in Washington. From location at Marcus, Wash., seven Great Northern Railway spans are towed downstream to power house at dam, where 965 tons of steel from old structure will go into framework of large equipment, storage and fabricating plant.

Flight Strips

Along Highways Will Aid Aircraft Landing and Take-Off

By LIEUT. COL.
STEDMAN SHUMWAY HANKS
United States Army Air Forces
Washington, D. C.

An address delivered Feb. 26, before the annual convention of the Association of Highway Officials of the North Atlantic States

JUST WHAT IS a "flight strip"?

Reduced to its simplest terms, a flight strip is an area for the landing and take-off of aircraft. Flight strips are located adjacent to the public highways, and maintained as a part of the highway right-of-way or roadside development area. Landing areas are in a very real sense the basis upon which aviation, civil and military, must rest. The flight strip is a simple answer to our urgent need for more such landing areas, vitally required for the defense of our land in war, and for the maintenance and advancement of aviation at all times.

Administration of the "Flight Strips" Program

Legal basis for the Flight Strips program is found in the Defense Highway Act of 1941, approved Nov. 19, 1941. That act authorizes the Commissioner of Public Roads, in cooperation with the Army Air Corps, to conduct studies and to carry on the construction of flight strips. The acquisition of new or additional lands needed for the program may be included as a part of the construction program, to the extent determined by the Federal Works Administrator, and federal funds may be used to cover the cost of such acquisition. The act authorizes an initial appropriation of $10,000,000 for the program, of which $5,000,000 has already been appropriated. Provision is specifically made that these funds, which may be used without regard to apportionment among the several states, shall be in addition to those available from any other source.

The actual building of flight strips will be accomplished by the Public Roads Administration. Technical advice and instructions as to the number, location, specifications and general nature of desired flight strips will be supplied by the Army Air Forces. A meeting attended by representatives of the Public Roads Administration, the Army Air Forces, and G. Donald Kennedy, president, American Association of State Highway Officials, was held in Public Roads Commissioner MacDonald's office Jan. 9, 1942 to formulate general plans for the carrying out of the program. As a result of this meeting, the Office of the Chief of the Air Corps recommended on Jan. 16, 1942 that the Commanding General of the Air Force Combat Command issue instructions regarding the location and development of flight strips to the Commanding Generals of each of the Army Air Forces in the United States. These instructions were dispatched on about Jan. 24.

Flight Strip Allotments

In the instructions to our Commanding Generals, attention was invited to the fact that the Commissioner of Public Roads was making four initial allotments of $2,000,000 each for the construction of flight strips to the Public Roads District Engineers within each of the four Air Force areas and they were advised that this work would be accomplished with the concurrence and approval of the respective Air Forces concerned. This work will be coordinated by the Commanding General of each of the four Air Forces in such manner as to prevent duplication of effort, and to insure the strategic placement of flight strips in the area under his command. In other words, existing facilities will be taken into consideration in planning the construction of flight strips in order that new sites will be located only when and if existing sites will not completely care for the tactical missions which will be required.

The Air Force Engineer in each of the Air Force areas will coordinate the selection of sites in the Public Roads districts within his own Air Force area, in terms of total military need, and will approve sites of first priority to the extent of the funds made available to his Area. It has also been decided that, in accordance with Section 17 of the Defense Highway Act of 1941, Army officers familiar with the work to be accomplished will be detailed to the

(Continued on page 114)

Levee Banks Paved WITH ASPHALTIC C

DRAGLINE BUCKET delivers asphaltic mix to prepared slope, as roller, operated by tractor at upper right, compacts surface.

NEAR THE TOWN OF MONTROSE, CALIF., just above vital aircraft production centers in the vicinity of Burbank and Glendale, work has been completed on a levee along one bank of Pickens Wash where a flood hazard arose from the fact that the materials of which the levee was built are subject to erosion. It was decided to safeguard the levee by paving the water face with asphaltic concrete for a length of 1,600 ft. The levee accordingly was trimmed to a 2:1 slope and the protective coating was made 5 in. thick, reinforced with wire mesh fastened to 2-in. pipe anchors driven down into the fill. Relief labor was available for the work, and the estimated cost for the 8,000 sq.yd. of the 5-in. paving is $14,000 or about $1.75 per sq.yd., exclusive of earthwork.

The height of the levee is such that when the slope to be paved was carried to a vertical depth of 6 ft. below the normal streambed to prevent undercutting, the width of the strip to be paved, as measured along the slope, became 65 ft. After smoothing this slope off to grade the first operation was to drive the 2-in. anchor pipes (old boiler tubes) which were spaced on 6-ft. centers both ways and driven 5 ft. into the ground. Asphaltic concrete then was brought to the job in dump trucks and a dragline with a 3-cu.yd. bucket was used for delivering the mix to the exact point required on the slope. Spreading and screeding were done by hand. The rolling was accomplished by a 580-lb. roller operated up and down the slope by a line from a tractor that moved along the top of the levee as the work progressed.

Central Mixing Plant

The asphaltic concrete was composed of dense graded aggregate of ¼-in. maximum size mixed in a central plant with 8.8 percent by weight of 50-60 penetration asphalt. This relatively high percentage, as compared to roadway pavement, was used because of the de-

(Continued on page 112)

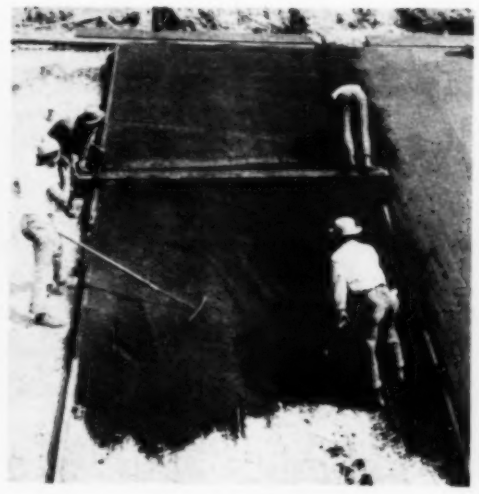
OLD BOILER PIPE 2 in. in diameter are driven on 6-ft. centers to serve as anchors for wire mesh. Mesh and header boards are already in place.

WHEN "HOT STUFF" is dumped, crew goes to work with rakes, spreading material as quickly as possible.

TIC

CONCRETE TO STOP EROSION

AS SPREADING PROGRESSES, wire mesh reinforcing is pulled up to center of 5-in. layer of pavement.



FINAL SMOOTHING OFF of slope is done by a 6x6-in. screed which spans 10-ft. width between headers.

INNER HEADERS are removed in sections and fresh mixture is raked into resulting groove before rolling starts. Compaction of previous panels has been completed and roller here awaits new panel.

ON PAVED SECTION of levee, trench for levee toe has been backfilled. Masonry parapet finish is yet to be added.

PAVER MIXER draws trailer-mounted water supply tank and vibratory spreader-box through which material is accurately placed.

Widening Finisher

Operates on 2-Ft. 3-In. Concrete Strip

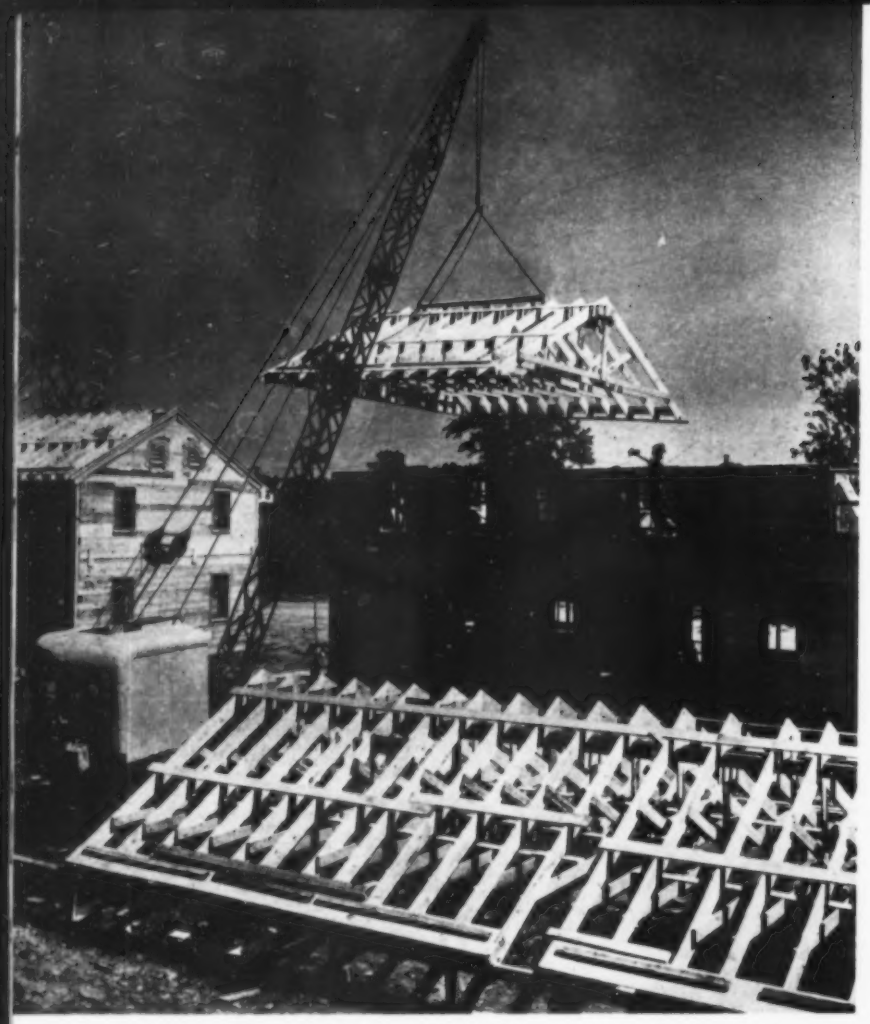
FINISHING 7,800 FT. of 2-ft. 3-in. concrete widening strip in 11 hr. with a 3-man crew is a recent record made on U. S. Route 24, east of Peru, Ind. by Brooks Construction Co., of Ft. Wayne, Ind., using a high-speed Jaeger widening finisher. The entire job behind the 27E paver was han-

(Continued on page 111)

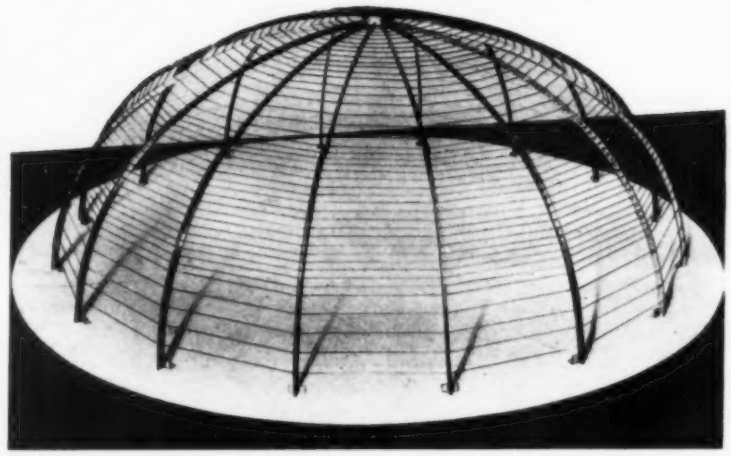
WIDENING FINISHER, designed for 4-to 6-ft. widths, has end shoe set in for 2-ft. 3-in. strip, striking off and finishing behind spreader-box.

HOW They Did It

CONSTRUCTION DETAILS For Superintendents and Foremen

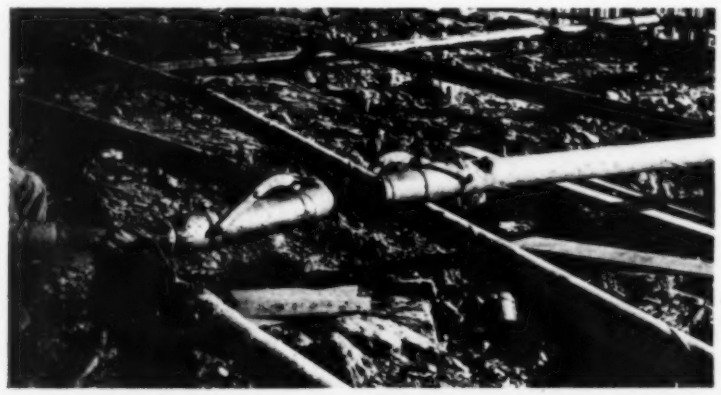


PREFABRICATED ROOF TRUSS FRAME is raised as unit and placed on one of the two-story units of the Tonomy Hill housing project for Navy's civilian personnel at Newport, R. I. Special site assembly methods, involving pre-cutting and fabrication of lumber in units ready for erection, featured field operations of M. Spinelli & Sons Co., Inc., contractor, of Boston, Mass., who built $1,496,000 project providing 538 homes under direction of U. S. Housing Authority (now Federal Public Housing Authority). In foreground, additional roof truss units are assembled, ready for installation.



FOR MUNITIONS STORAGE in a group of segregated units, concrete "beehive" design has been developed by Louis Corbetta, secretary, Corbetta Construction Co., New York City. Each unit is dome of concrete with walls 6 in. thick reinforced with framework of curved steel bar-trusses to which are welded horizontal rings of ⅜- and ¼-in. wire forming circumferential tension members. Floor is 6 in. thick mesh-reinforced concrete slab not connected in any way with dome that rests upon it. With diameter of 44 ft. 7 in. and inside height of 15 ft. 2¼ in., these "beehives" have storage capacity equivalent to that of 60-ft. long half-cylinder "igloo" type of magazine previously constructed at Army ordnance plants. Completed dome is covered with protective earth blanket. Design requires less than half as much steel as is needed for igloo type storage units and reduces man-hours of labor for construction.

TO COMPACT hot-laid asphaltic concrete widening strip on waterbound slag base alongside brick pavement of State Route 5 west of Warren, Ohio Department of Highways operates Galion trench roller equipped with tandem flat wheels.

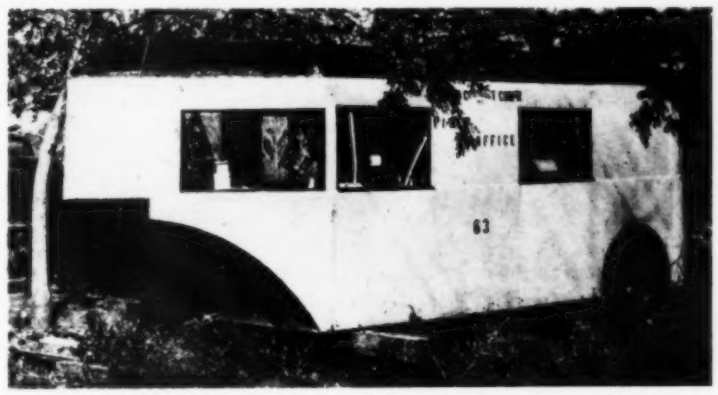


SYSTEM OF "RAINMAKER" PIPE at Keswick Dam, U. S. Bureau of Reclamation project in California, is example of ideas ingenious contractor borrows from other fields of activity. Although 4 in. in diameter, this pipe weighs only 3 lb. per ft. It is spiral-wind construction developed to meet agricultural demand for lightweight pipe suitable for overhead irrigation systems. Light weight, when used with couplings so designed that one man can quickly connect or disconnect, makes pipe handy on construction jobs and Atkinson Kier Co. has used it throughout Keswick job for both water and air deliveries.

BIG LOADS AND HIGH SPEEDS (left) are made possible by these Mack truck-trailer units each equipped with six Heil bodies for transport of rock over 12-mi. privately-built haulage road from quarry to plant of Southwestern Portland Cement Co. at Victorville, Calif. Marion shovel loads 60 tons of rock into six dump bodies on each tractor-trailer unit which travels at speeds up to 60 mph. Pat Dowling Photo

PROTECTION AGAINST TERMITES in construction of wood frame barracks for U. S. Army use at Fort Jay, New York, is provided by capping concrete columns with metal pans, forming barrier between ground and timber members of structure.

Photo, U. S. Army Signal Corps



TRAILER OFFICE of Western Contracting Corp., Sioux City, Iowa, moves with construction force from job to job. Trailer carries complete equipment and supplies for office work.

TRUCK-CRANE TEAMWORK raises 38-ton cab and hoisting machinery of 50-ton capacity Clyde crane to position atop steel gantry tower at West Coast shipyard. Each of pair of Bay City truck-mounted units, operated by Bigge Drayage Co., is equipped with an 85-ft. boom. Method employed was to make vertical lift and then hold load at proper height while tower was moved into place under cab. Load then was eased down until wheels of revolving cab rested on circular track of traveling tower.

SCAFFOLD STIRRUPS are saved from abrasive wear by fitting them with swivel casters, as illustrated. Block of hard wood **(1)** grooved to fit, is placed between caster and stirrup. Device is held in place by two U-bolts running through block **(2 and 3).** Swiveling feature of casters takes care of sideways movement of scaffold along wall, as well as vertical movement. Stirrups are securely fastened to platform by threaded U-bolts with steel crosspiece between legs held by wing nuts. — Photos from ANDY VENA, New York City.

PROTECTION FROM GRIT (below) at stone crushing plant of Halvorsen Co., Rochester, Minn., is assured for mechanism of Simplex jacks by covering them with hoods in form of cleaned cement sacks.

INVERT PLATES are first set in trench and to them crane on bank lowers curved sections which are bolted to form circular section 10 ft. in diameter.

COMPLETED SIPHON under Boogs Creek will replace old wood flume shown at left of new 10-ft. diameter conduit.

Asphalt Strips

Produce Tight Joints in 10-ft. Multi-Plate Siphon

WATERTIGHT JOINTS between plates of a 10-ft. diameter siphon of Armco corrugated metal, constructed by the Bessemer Irrigation Ditch Co., of Pueblo, Colo., were obtained by inserting asphaltic strips along the seams formed by bolting together in the field overlapping sections of the multi-plate conduit. The new siphon underneath Boogs Creek was built to replace an old wood flume and has a length of 240 ft., with 30-deg. ells at either end terminating in reinforced concrete inlet and outlet structures, slightly tapered to reduce loss of head. The carrying capacity of the big pipe is 386 sec.-ft. The siphon construction was done by company forces under the direction of A.N. Dallimore, superintendent.

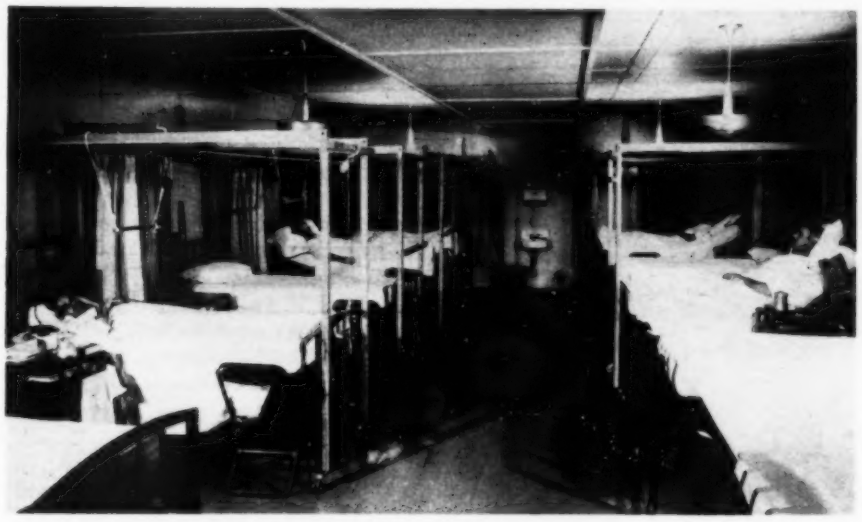
The curved sections of corrugated plate of 7-gage ingot iron arrived on the job properly punched for field assembly by bolting in the trench. Longitudinal joints were made with a double line of bolts, two for each corrugation, while circumferential joints had a single line of bolts spaced on 6-in. centers. The asphaltic strips introduced between plates at all joints were about

(Continued on page 111)

ASPHALTIC STRIP (below) with width of 5 in. and thickness of 1/4 in., is applied along edge of longitudinal joint between plates to form watertight seal.

30-DEGREE ELLS (below) carry 10-ft. diameter multi-plate siphon to concrete inlet and outlet structures.

SHASTA DAM HOSPITAL located at construction camp in Sacramento River canyon, just downstream from damsite, is maintained by Pacific Constructors, Inc., under direction of Dr. J. E. Kirkpatrick, chief surgeon.



CONVALESCENT WARD has capacity of 12 beds, equipped with electric call button and radio ear phones.

Modern Hospital

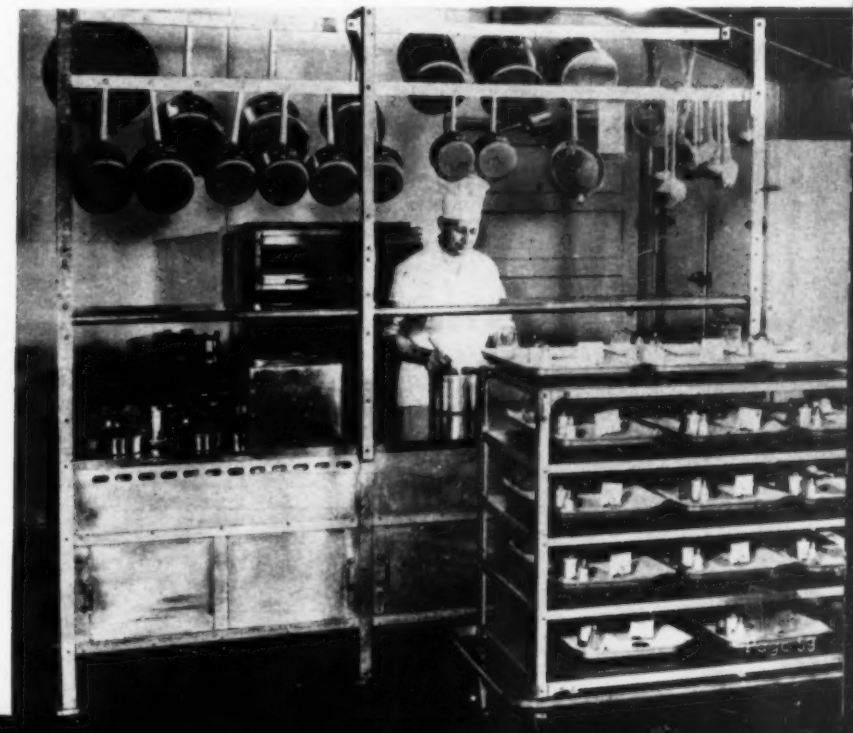
SERVES CONSTRUCTION WORKERS AT SHASTA DAM

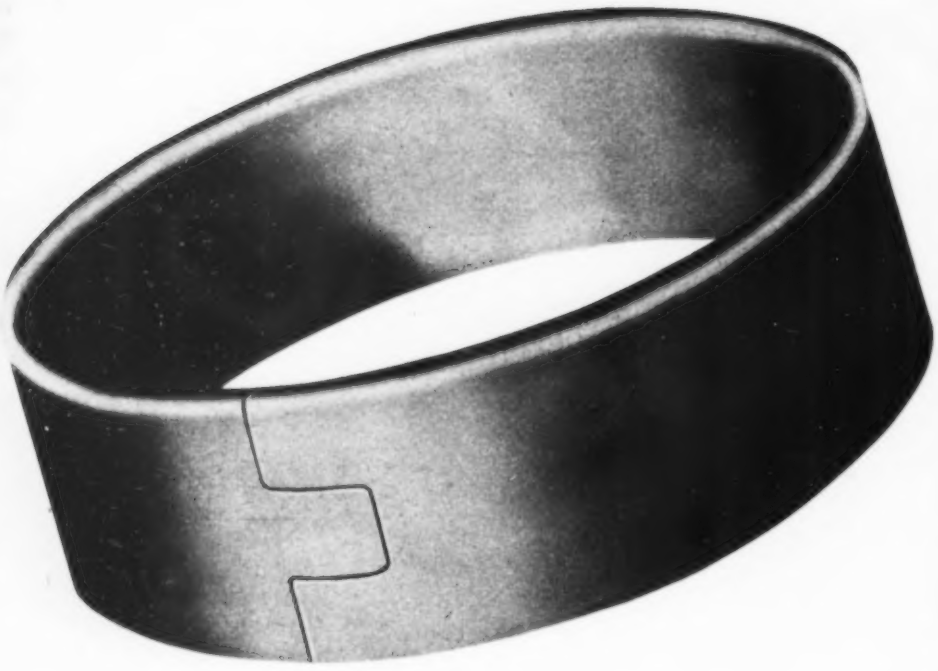
RECORD CHARTS for each patient are kept by nurses of hospital staff.

ONE OF THE BEST EQUIPPED HOSPITALS in northern California is that maintained at Shasta Dam by Pacific Constructors, Inc., the contracting firm which is building this feature of the Central Valley project under the direction of the United States Bureau of Reclamation. The air-conditioned hospital is located at the construction camp in the Sacramento River canyon just downstream from the dam. It is equipped with 25 beds, an emergency room, surgery room, clinical laboratory, physio-therapy room, X-ray laboratory, offices, and modern kitchen. The hospital facilities are available to the public on a limited basis, as well as to Shasta Dam employees During 1941 a total of 29,452 patients received medical and surgical care at the Shasta Dam hospital.

IN DIETARY KITCHEN (below) hospital chef prepares special meals for patients from construction personnel.

IN OPERATING ROOM (below) surgical treatment is available for any type of serious or minor injury that construction workers may suffer.





Timber Connectors

Feature Truss Fabrication for Lumber Plant Expansion

By EDWARD FENTON

Timber Engineering Co., Washington, D. C.

USE OF THE Teco timber connector system is streamlining the plant expansion and modernization program of the Red River Lumber Co., Westwood, Calif. This application of timber engineering methods has made the buildings economical to construct and efficient to operate.

The company began using the connector system in 1936, when it erected a 96x257-ft. car-loading dock. Requirements were met by designing a simple Fink truss of which thirty-six were fabricated by company workmen at their own mill. Placed end to end, two clear-span 47-ft. trusses left floor space unbroken except for a single center line of 21-ft. posts.

This first experience with the connector system convinced T. S. Walker, vice-president and manager of the company's lumber division, that economical timber sizes could be used where unwieldy beams or other materials had once been necessary. Deciding that the development actually opened a new construction field, he asked his engineers to study the latest timber engineering methods. Within the next year there was built a 100x338-ft. addition to the loading dock with 18 flat-top trusses of 99-ft. clear-span. The trusses were spaced 14 ft. on centers, using 21-ft. posts. Red River engineers had further experience with the connector system on three other jobs: an automatic stacker-building, a planer building, and a school building to house shop and music departments. The 32x120-ft. stacker building used nine 30-ft. simple Fink trusses, spaced 10 ft. and 14 ft. on centers, with posts 21 ft. 4 in. high; the 47x48-ft. planer building was made with four 47-ft. simple Fink trusses spaced 18 ft. on centers and with 32-ft. posts; the school building, 62x130 ft. in size, used eleven 60-ft. flat-top trusses spaced 13 ft. on centers and with 13-ft. posts.

Next on the schedule was a 37x60-ft. addition to the power house. Five 35-ft. simple Fink trusses spaced 16 ft. on centers with 26-ft. posts, were used in its construction. There followed a second addition to the loading dock, this one 54x66 ft. in size. It was built with five 52-ft. flat-top trusses spaced 16 ft. on centers, using 21-ft. posts.

Most impressive of the Teco-built structures, from the standpoint of size, is the 84x800-ft. rough lumber shed. The vast interior of this building is completely free of posts, thus allowing a traveling crane to carry a load from one end to the other without obstruction. The first section of the building, 500 ft. long, was erected in 1938 and a second 300-ft. section was added in 1941. A total of 46 bow-string trusses was used, those for the initial building being 81 ft. in length, with 80-ft. trusses used in the addition. In both cases they were spaced on 20-ft. centers. Since exterior support for the sidewalls would have meant loss of valuable ground area, the structure was supported internally by trussing the 44-ft. wall posts and the 32-ft. posts supporting the crane track. The connector system allowed trussed posts to be built up from relatively small timber, without sacrifice of strength.

Similar trussed posts were used in the construction of a 66x98-ft. truck loading shed, built in 1939, where a traveling crane was also necessary for efficient operation. The trussed building posts were 36 ft. high, the crane posts 29 ft. Spanning the shed are seven 64-ft. flat-top trusses, spaced 20 ft. on centers.

Red River continued to press forward with the same type of construction in 1941, when work was launched on a 54x92-ft. rough rip and trim building and a 108x422-ft. surface rip and trim storage building. Plans called for the first structure to use six 52-ft. flat-top trusses spaced 18 ft. on centers, with 21-ft. building posts. For the larger building there was designed a 105-ft. bow-string truss, 22 of which were to be spaced 20 ft. on centers, with 48-ft. building posts and 35-ft. crane posts.

(Continued on page 112)

1. **LOADING DOCK EXTENSION** is 100x338-ft. structure with 18 trusses of 99-ft. clear span spaced on 14-ft. centers.

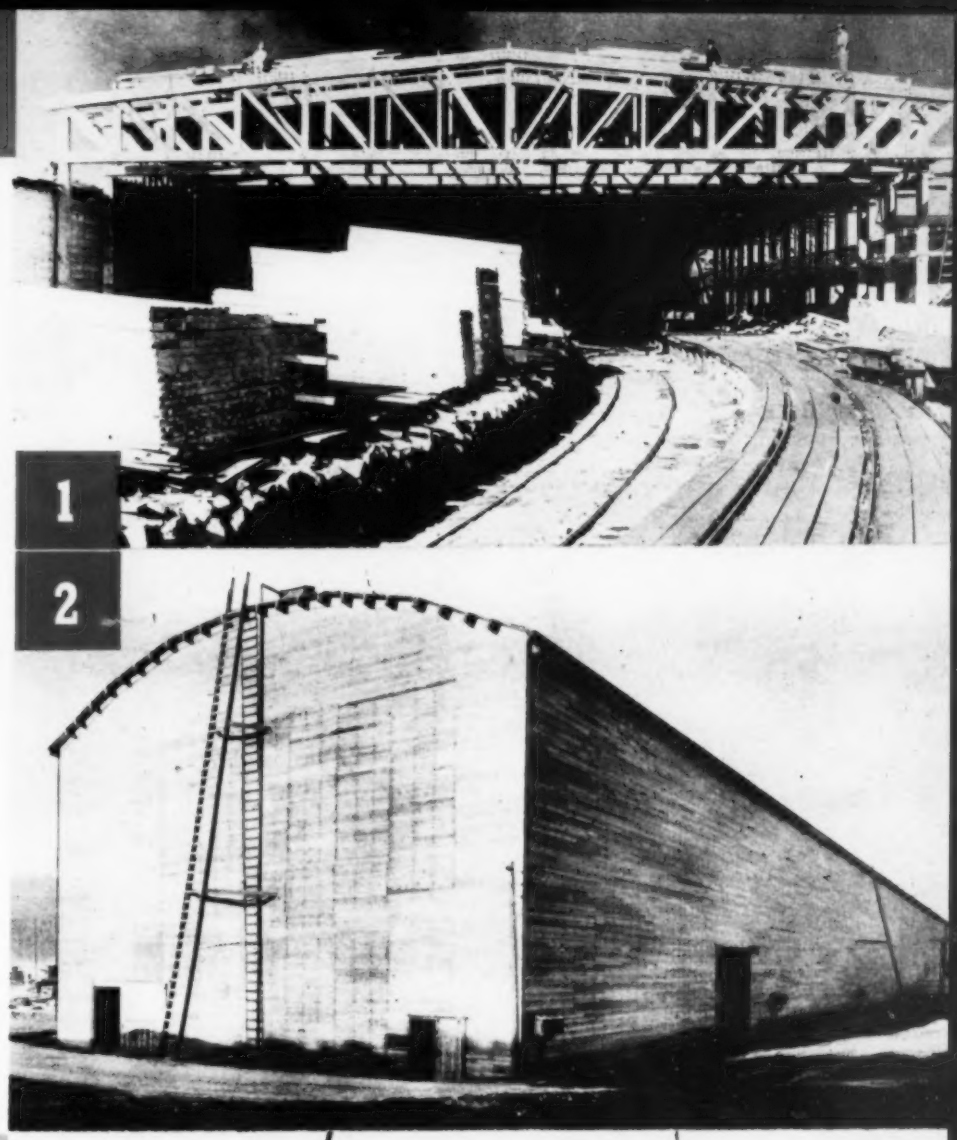
2. **HUGE COMPLETED SHED,** 84x800 ft., for rough lumber avoids waste of ground area by using trussed posts to eliminate need of exterior wall support.

3. **ROUGH LUMBER SHED** is structure 84 ft. wide and 800 ft. long, built in two sections of 500 ft. and 300 ft., respectively. Timber-connected bow-string trusses of 80-81-ft. span, spaced on 20-ft. centers, provide main aisle without posts for passage of traveling crane.

4. **TRUSSING OF WALL POSTS** and posts supporting crane track eliminated need for exterior support of sidewalls of rough lumber shed, thus conserving valuable ground area. Use of connectors made possible use of small timber for trussed posts. Crane boom extensions aid placing of bow-string trusses on wall posts 44 ft. high.

5. **TRUSS AND POST ASSEMBLY** are raised as unit by pair of locomotive cranes at site of loading dock extension. Flat-top truss has 99-ft. clear span and posts are 21 ft. long.

6. **DEMOUNTABLE SHOP SECTION** of local high school has eleven 60-ft. span flat top roof trusses carried on 13-ft. high posts, spaced 13 ft. on centers. Use of connector system allows structure to be knocked down and set up again at new site.



DOUGLAS FIR PLYWOOD GUSSETS 1⅜ in. thickare used on 9-ft. centers for "wind trusses." Building width is 25 ft. 4 in.; standard rafters go in between wind trusses.

Construction Details

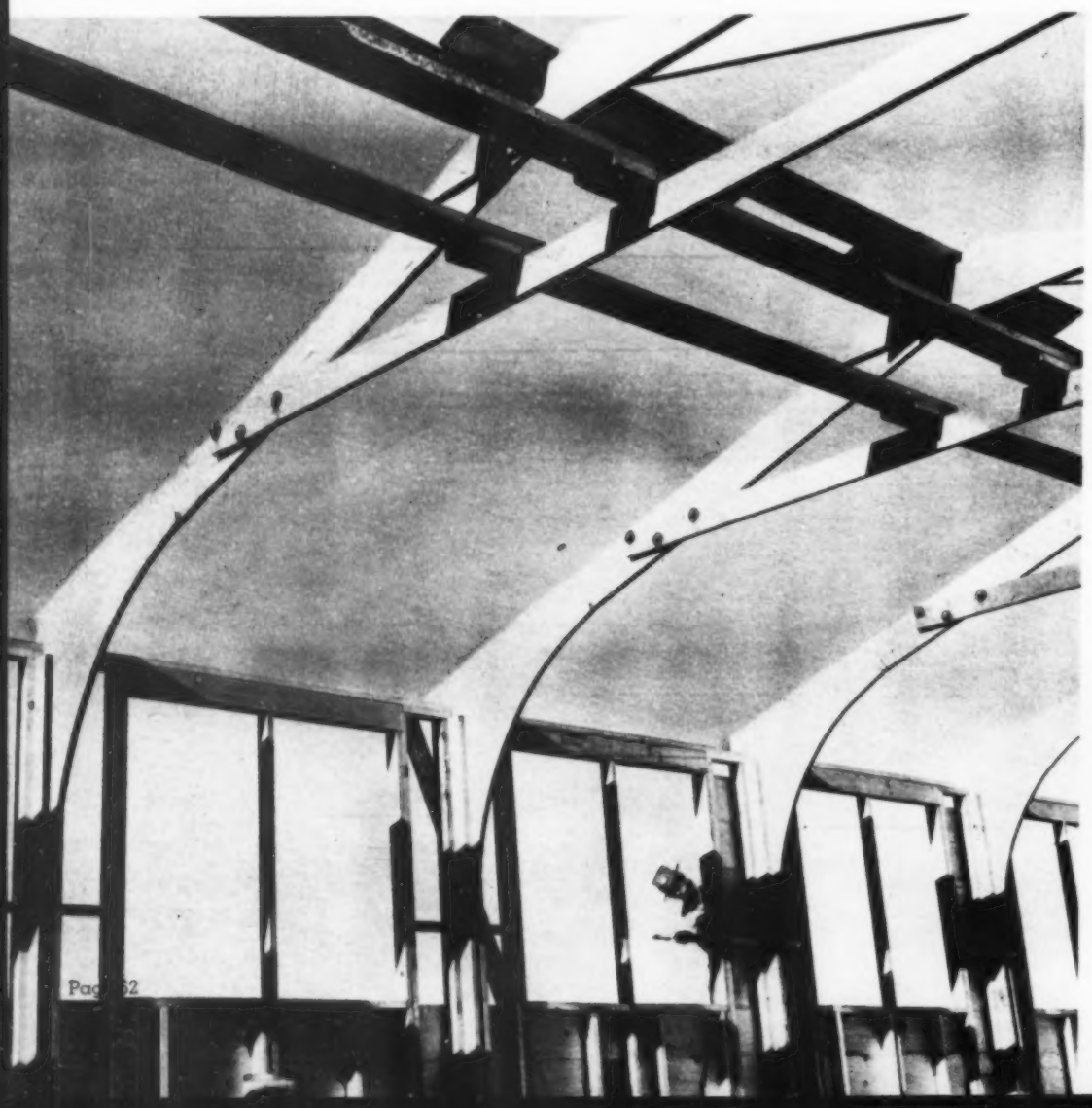
At Army Camp for More Than 25,000 Men in California

IN SOUTHERN CALIFORNIA Uncle Sam owns nearly 100,000 acres of land on which facilities are being constructed for a more than 25,000-man encampment. Plans and specifications were prepared, under the usual demand for speed, by the engineering firm of Leeds, Hill, Barnard & Jewett, Los Angeles, holders of the architect-engineer contract. Contract for construction was awarded to the Ford J. Twaits Co. and Morrison-Knudsen Co. Features of the construction program and noteworthy details are illustrated in the accompanying pictures.

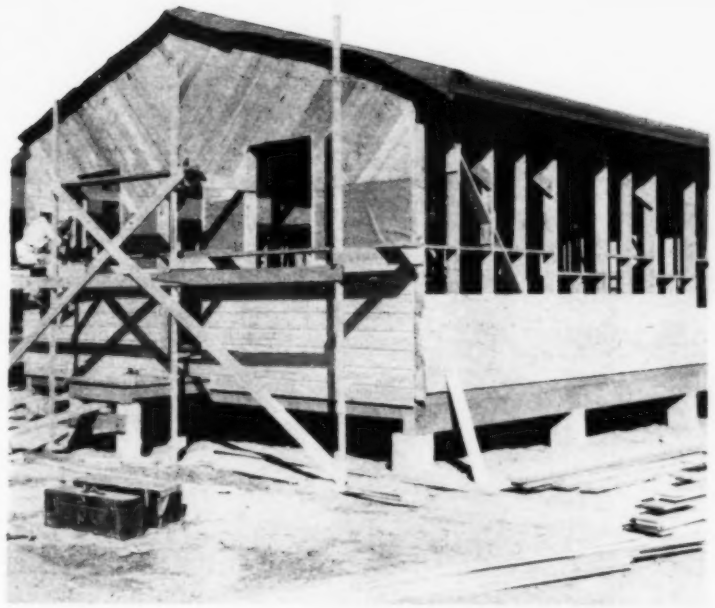
The camp water supply is obtained

(Continued on page 64)

CURVED PIECE cut out to form gusset is used as tie at peak. This construction produces stiffer building and is said to cost no more than old knee-braced roof structure.

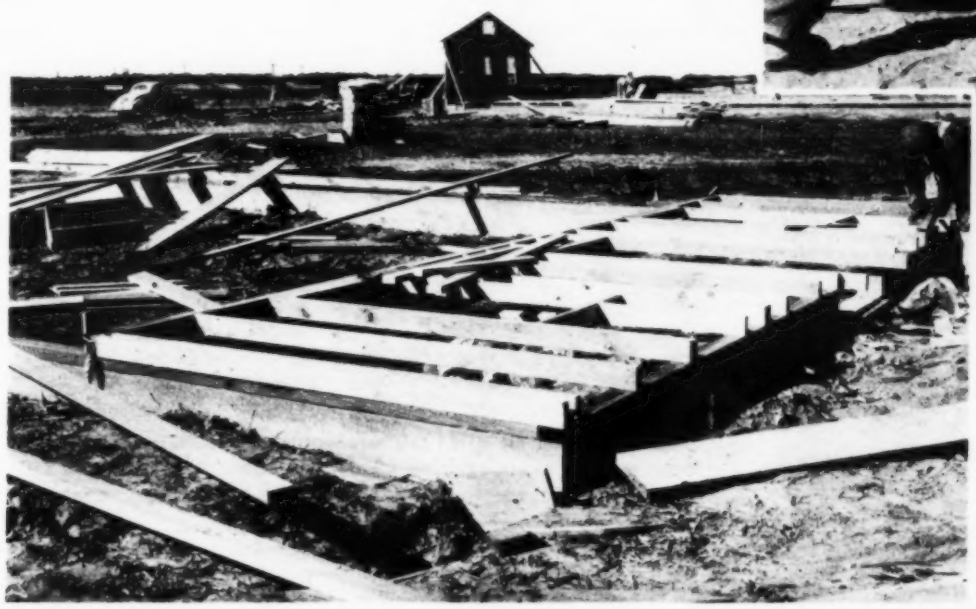


WELL DRILLING RIG puts down one of 18-in. well casings—some of them 200 ft. deep from which camp water supply is drawn.



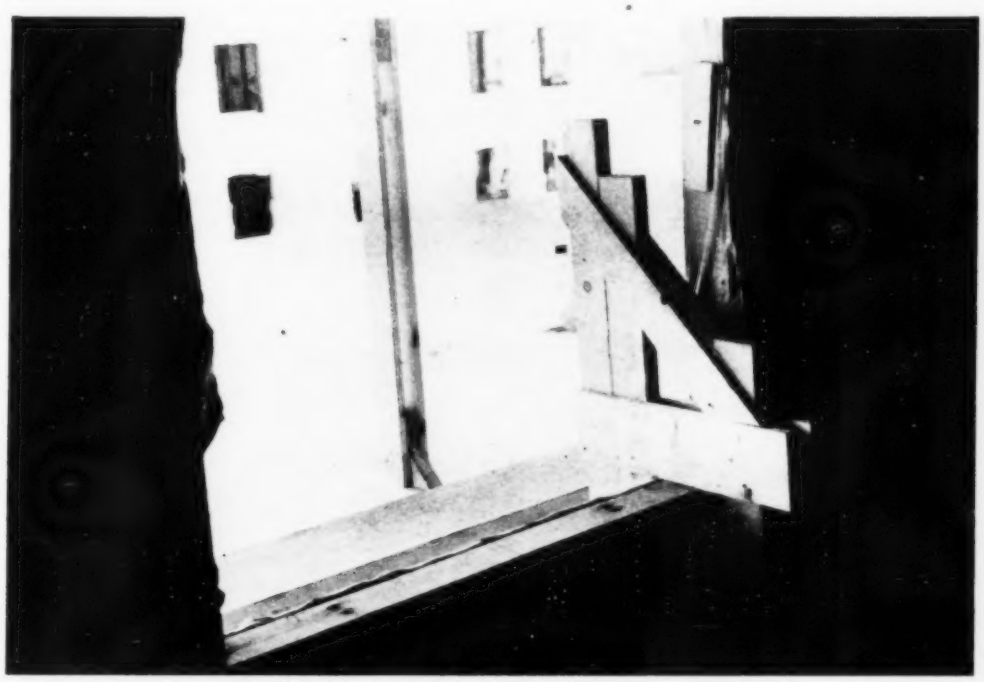
ONLY FEW OF EARLIER BUILDINGS are supported on concrete piers; continuous footings for all exterior walls soon became standard.

CONTINUOUS EXTERIOR WALL FOUNDATIONS of concrete cost less for forming, all factors considered, than did individual pier type, formerly used in camp building construction.

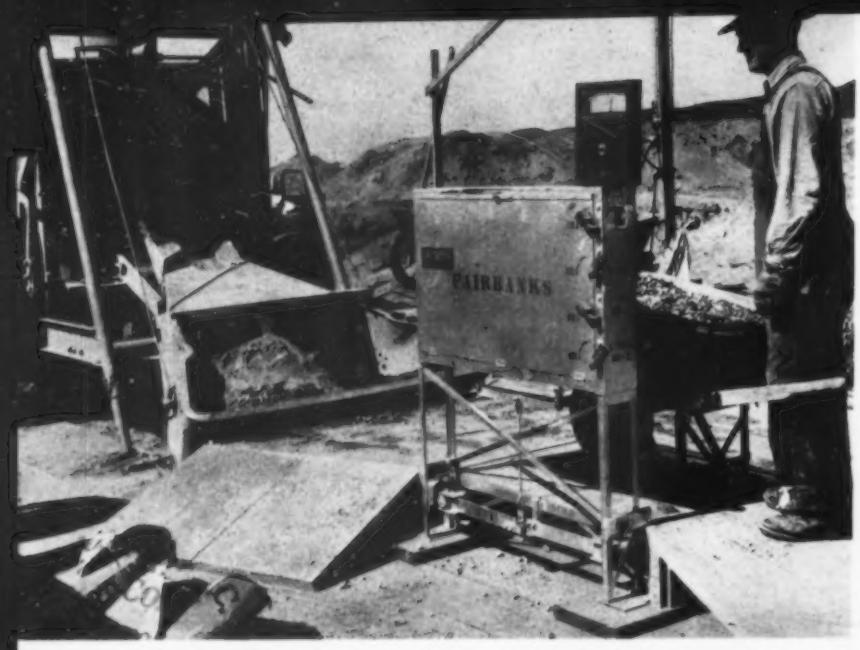


CONTINUOUS WALL FOUNDATION affords greater stability against earthquake shocks, gives cleaner substructure and increased construction speed.

PAINTERS' RUNWAY-SCAFFOLD (below) for second-story use has handrail posts built in as integral parts of hanger. It is necessary only to take off handrails and walk boards before scaffold is moved.



DETAILED VIEW OF HANGER for painters' scaffold, from inside window. This hanger is constructed to allow about ½ in. clearance over full wall thickness. When hanger takes its load, inside of hook is brought snugly against inner face of wall.



DIAL OF THIS SCALE is marked "over" and "under" on opposite sides of centerline. Barrow operator sets weighing beam of this Fairbanks unit for kind of material he is carrying and then makes necessary quantity adjustment; small quantity of each material is kept near scale. Master beam is compensated for tare weight.

POWER-DRIVEN POST HOLE AUGER digging holes for telephone pole line of Army Signal Corps.

A 3-IN. SOIL PIPE TRAP is here being calked into assembly on plumbing bench with aid of Thor pneumatic calking tool

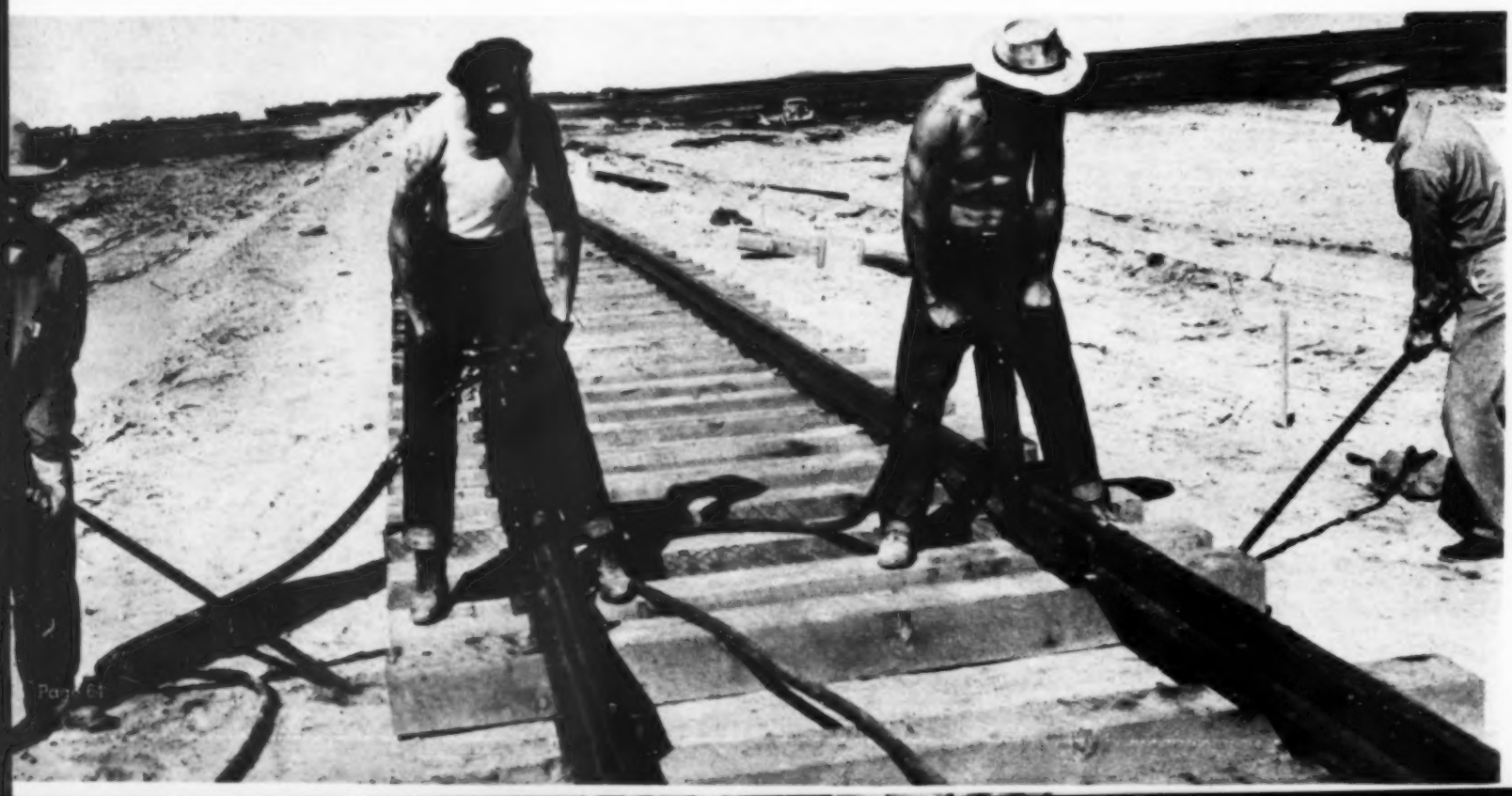
from gravel beds underlying a river. To protect and conserve this supply, a dike 1,100-ft. long was built across the river channel near its mouth where the dike serves the dual purpose of keeping out the salt water at high tide and, in periods of flood runoff from the drainage basin, retaining, on the opposite side, the flood waters, giving them time to percolate into the subterranean gravel storages tapped by the wells.

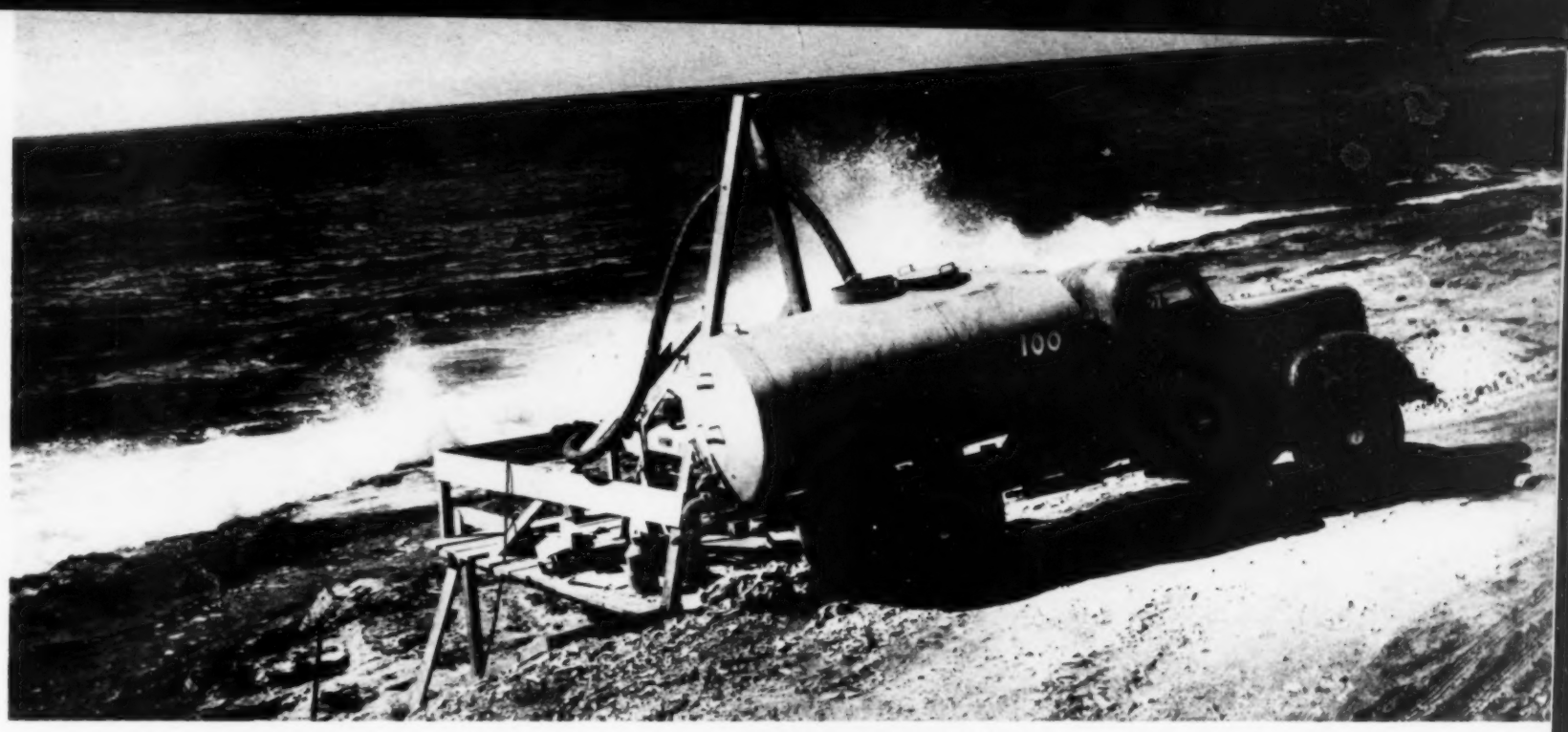
A group of 18-in. cased wells was put down, some to depths of 200 ft. Some of these have produced as much as 2.3 mgd. and five wells have shown a combined capacity exceeding 9 mgd.—enough, it is estimated, for a camp population of 40,000 men.

The casings in these wells have the shutter-screen or louvre type of horizontal perforations, said to be particularly effective in gravels containing large amounts of sand. The well drilling was the first of 22 schedules in the camp contract to be completed.

Although a few buildings put up in the early days of the construction period had foundations of the pier or pedestal type, nearly all the camp buildings have continuous exterior wall footings. This type of footing for cantonment buildings is said to cost less for forming than do the individual piers,

ON 16 MILES OF RAILROAD (below) at this camp, power tools were used for track construction. Here are shown Chicago Pneumatic Tool Co. hammers driving spikes.





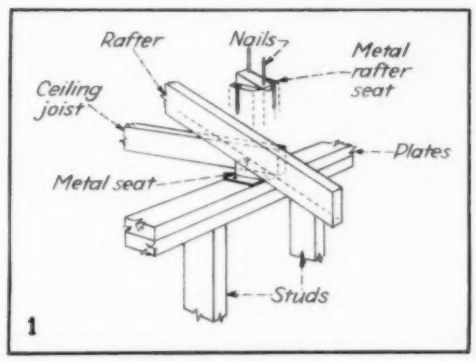
SPRINKLER TRUCK of 1600-gal. capacity receives its load at seashore pumping station. Salt water was used for sprinkling roads and parking areas until the camp fresh-water system was completed.

when all factors are considered. Advantages are the increased stability against earthquake shocks so damaging to the free-standing pier, a cleaner substructure and increased construction speed.

On two-story buildings, the window hangers for painters' runway scaffolds were found to be exceedingly convenient and because of the ease with which they could be taken down and used again, they contributed materially to the speed of construction. This type of scaffold is designed to allow about ½-in. clearance over the full wall thickness. Load on the hanger brings the inside "hook' snugly against the inner face of the structure. The handrail posts are integral parts of the hangers and only the handrails and walk boards are removed when the scaffold is taken down for removal to a new location.

(Continued on page 126)

TO SUPPLY ROAD SPRINKLERS Waukesha gasoline engine, driving centrifugal pump with 4-in. intake, lifts water from sea.



1 RAFTER SEAT DETAILS and method of installation.

2 PREFABRICATED RAFTER ASSEMBLIES, with rafter seats in place, stacked ready for erection.

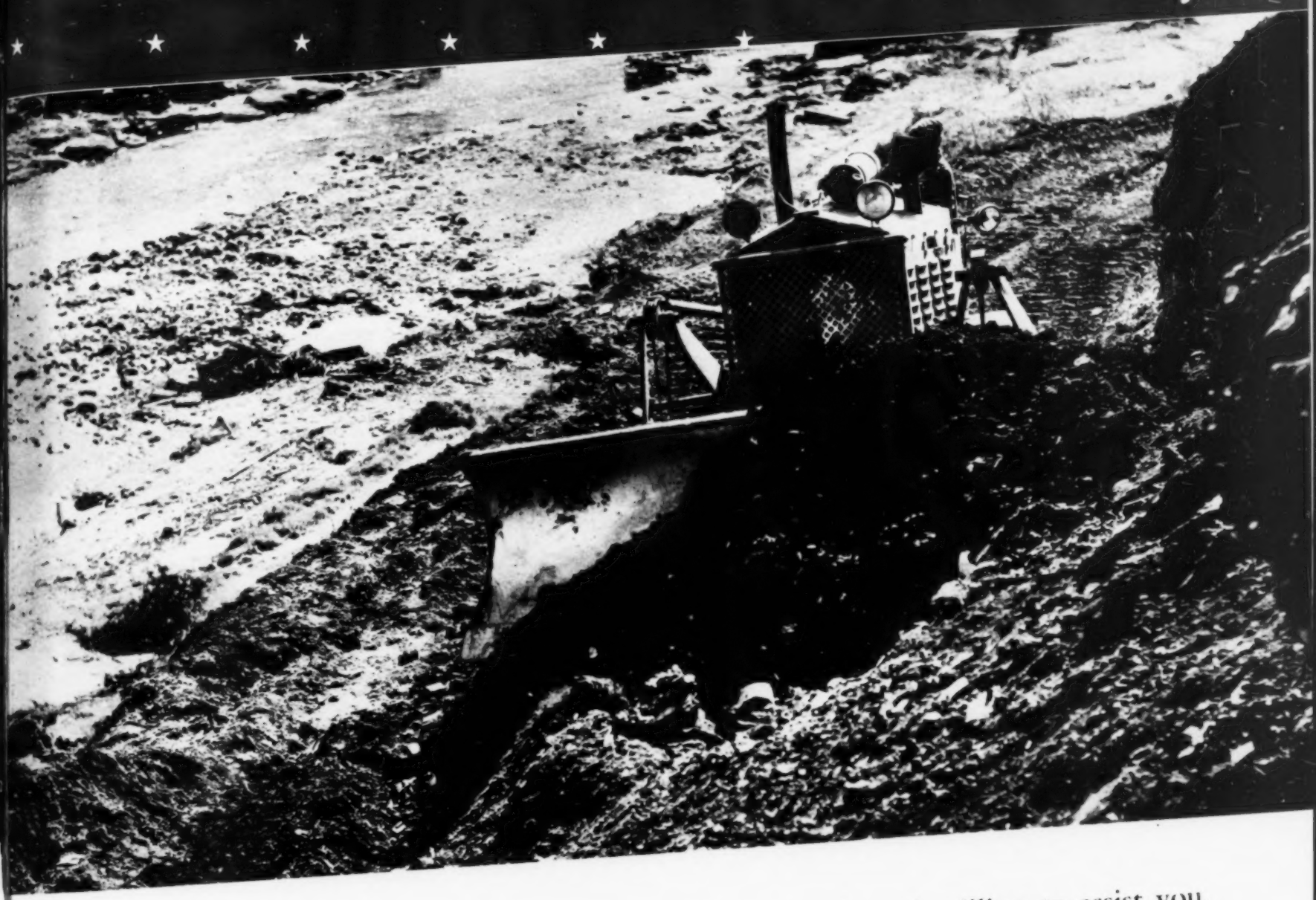
3 AFTER ERECTION (right) are supported by metal seats without necessity of matching lumber.

NEW or OLD

Today Cletrac owners have more reason than ever before to be thankful that their tractors are engineered and built to keep running. Because our armed forces have first call on Cletrac's Production, we suggest that you keep your present tractors in first class shape by regular

THE

Keep Them Running

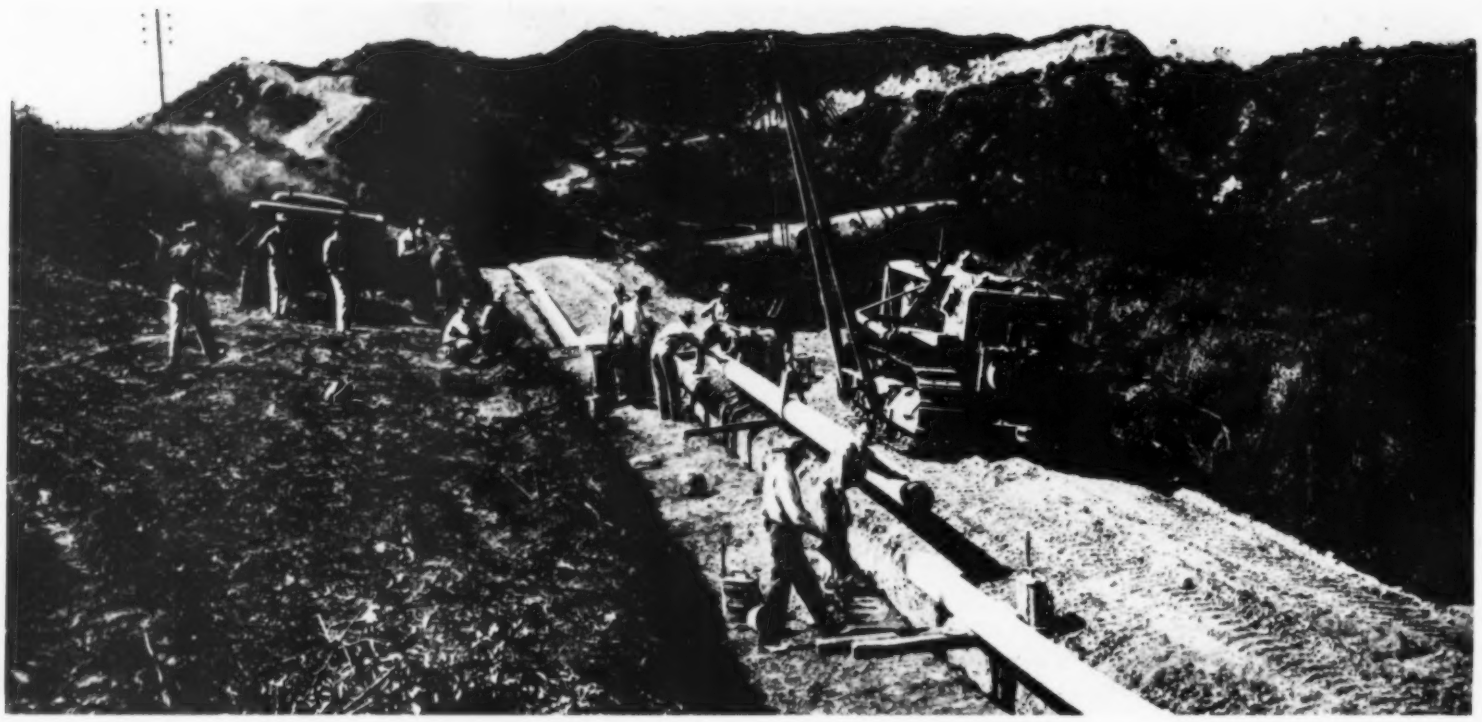


check ups with your Cletrac dealer. You will find him ready and willing to assist you. He has factory trained service men who know their business, and a parts stock to take care of your repairs.

Cletrac Crawler Tractors—18 to 96 H.P.

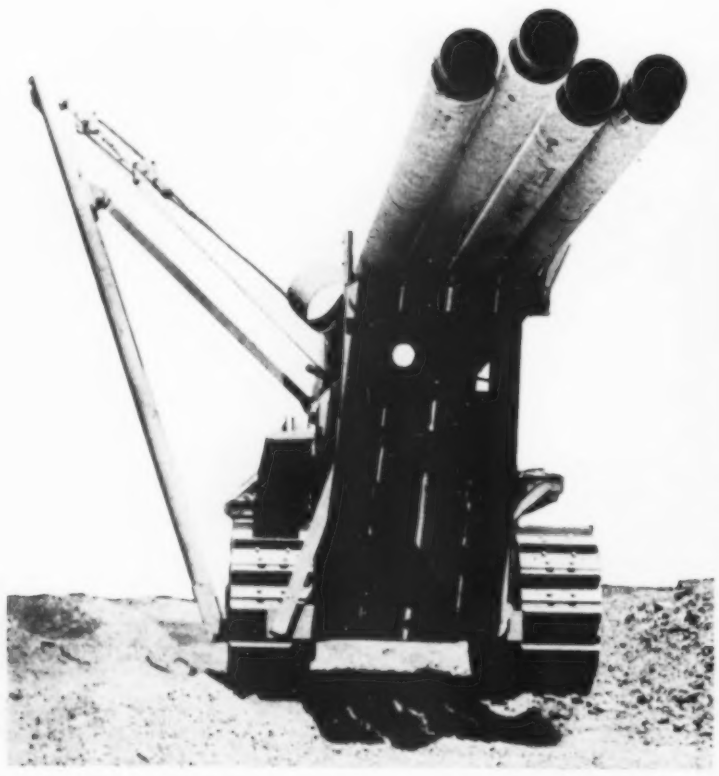
CLEVELAND TRACTOR COMPANY

CLEVELAND, OHIO



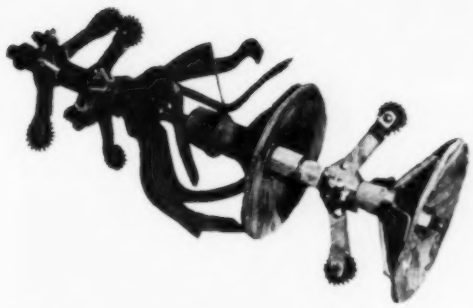
SIDE-BOOM RIG on Caterpillar diesel tractor handles length of 10¾-in.diameter pipe along right-of-way in mountainous terrain. At left is Lincoln electric welder ready to make joint in line.

Over Mountain Route 83-Mile Pipe Line Is *Completed in 60 Days*



PIPE-CARRYING PLATFORM, which may be raised and lowered by swinging in vertical arc for loading and unloading, is rigged on tractor for delivery in mountainous country.

FINAL WELD in 83-mi. oil pipe line is made by Lincoln shielded-arc equipment in hands of Sidney Belither, chairman of board of Shell Oil Co.



GO-DEVIL is passed through completed 10¾-in. pipe line to clear out loose obstructions and debris before placing in service.

WITH 650 MEN working in seven construction crews at different points on the line, the Macco-Robertson Co., contractor, of Clearwater, Calif., completed within a period of only 60 days an 83-mi. pipe line linking oil fields at Ventura, Calif., with the Shell Oil Co.'s refinery at Wilmington, south of Los Angeles. The new line for the delivery of petroleum products overland instead of by water was built at a cost of $2,000,000 across stretches of mountainous terrain to release oil tankers for other vital service. Requiring 9,000 tons of 10¾-in.-diameter seamless steel pipe, weighing 40.48 lb. per ft., and protected by an asphaltic mastic coating, the line is designed to operate under a pressure of 1,000 lb. per sq. in. and has a capacity of delivering 40,000 bbl. daily.

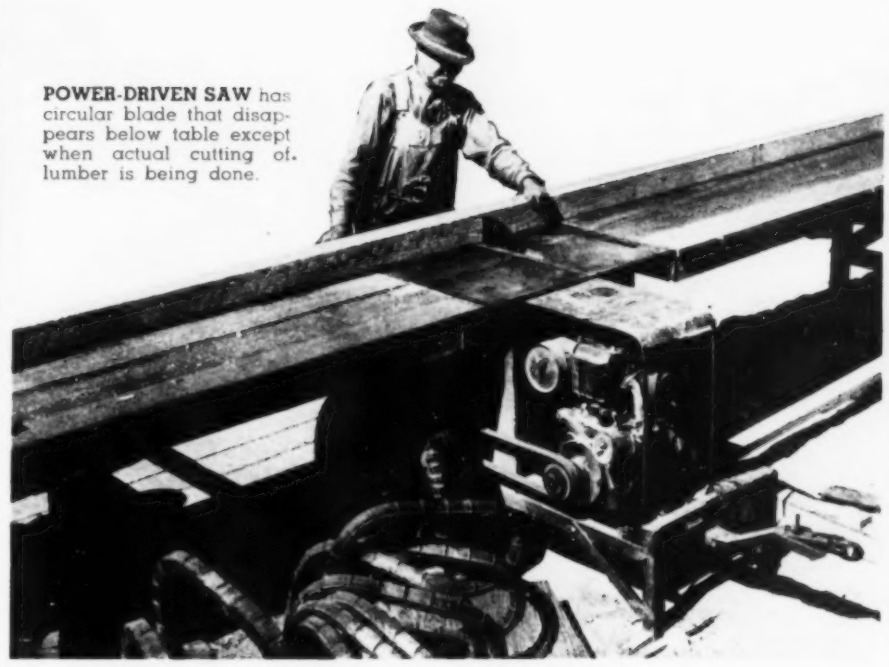
Contributing to the rapid completion of the line was the use by the contractor of a full quota of mechanical equipment, some of it of special design for delivering pipe over precipitous grades along the slopes of the Santa Monica mountains. Field joints were made by portable arc-welding rigs, and the pipe

(Continued on page 125)

FOR GOOD LUCK a horseshoe is placed in final section of pipe trench just before it is backfilled. Participating in ceremony are John MacLeod, of Macco-Robertson organization, S. Belither, vice-president, and F. B. Sims, manager, pipe-line department, Shell Oil Co.

Safety Saw

CUTS FORM LUMBER

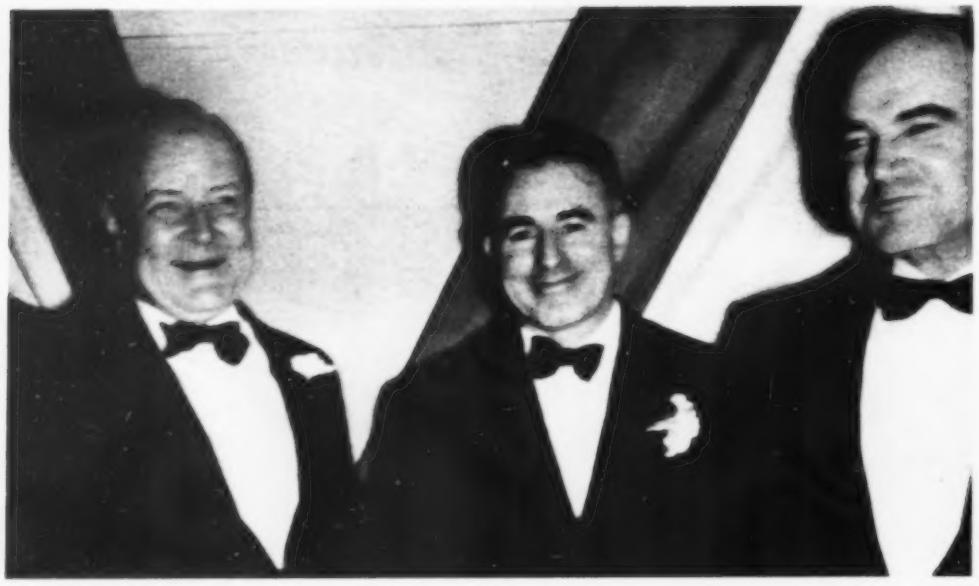


POWER-DRIVEN SAW has circular blade that disappears below table except when actual cutting of lumber is being done.

A LARGE AMOUNT of cutting on dimension lumber for forms and falsework in the 1,700-car underground garage being built in downtown San Francisco, is done more speedily and safely because the power-driven saw used is of the disappearing-blade type. With this equipment, the saw can be kept running constantly *below* the steel table on which the cutting is done. The timbers are moved freely across this table without risk to the operator and when he is ready to make the cut, the circular saw is drawn up smoothly through the timber from below, quickly dropping back into a safe position so that the timber just cut and the one that follows it move without risk over any part of the table top. This is a Superior saw, driven by a Le-Roi gasoline engine. Contract for the Union Square garage is held by McDonald & Kahn, San Francisco.

FOR FORMS AND FALSEWORK on San Francisco's underground garage a great deal of cutting of dimension lumber was required.

Present and Accounted For A PAGE OF PERSONALITIES



NEW OFFICERS OF THE MOLES, New York organization of men engaged in tunnel, subway, foundation and other types of heavy construction, are installed at organization's recent annual meeting. For 1942, president is ALEXANDER LYLE **(right)** chief engineer, The Carleton Co.; first vice-president, JOHN S. MACDONALD, **(center),** chief engineer, Walsh-Driscoll Construction Co.; second vice-president ARTHUR A. JOHNSON, president, The Arthur A. Johnson Corp.

BUILDING OF ALASKA HIGHWAY is new responsibility of COL. WILLIAM M. HOGE, Corps of Engineers, U. S. Army, who has arrived in British Columbia to direct construction of strategic traffic link-into Yukon Territory, in cooperation with Public Roads Administration

Press, Assoc. Photo

REORGANIZATION OF ARMY into three main commands (air forces, ground forces and supply) results in promotion of Corps of Engineer officers in new Services of Supply, under Lieut. General Brehon B. Somervell. BRIG. GENERAL WILHELM D. STYER **(left)** has been named chief of staff, and BRIG. GENERAL LUCIUS D. CLAY **(right),** is now in charge of Requirements. Gen. Styer was recently deputy chief of the Construction Division and Gen. Clay directed airport construction for the Civil Aeronautics Administration.

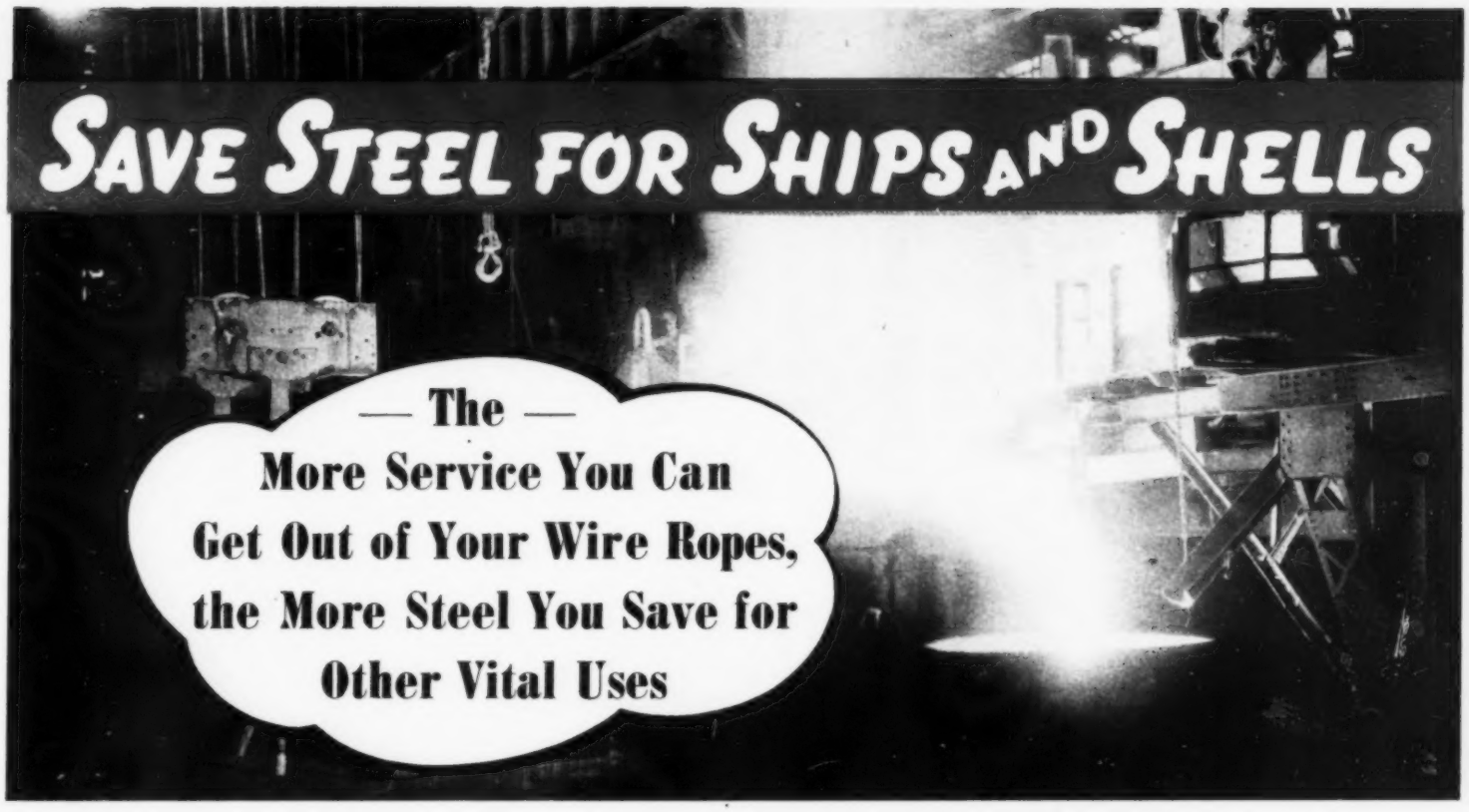
Photos, U. S. Army Signal Corps

NEW DIRECTOR of Alabama State Highway Department is WILLIAM G. PRUETT **(below),** succeeding Chris J. Sherlock who resigned to become candidate for Governor of Alabama. Formerly office engineer of the department, Mr. Pruett, age 36, is youngest man to be named highway director in Alabama. He is a graduate of Alabama Polytechnic Institute and has served the highway department as draftsman, instrument man, chief of party and resident engineer.

ILLINOIS CONTRACTORS ASSOCIATION elects as its president for year 1942, J. F. PARKER **(below),** manager, O'Connor Construction Co., of Springfield, Ill. He succeeds in office J. E. Dippold, of the Edwardsville Construction Co. Among recent large-scale road-building jobs which Mr. Parker has directed is the paving of the belt-line route at Bloomington, Ill.

NEW PRESIDENT of Association of Highway Officials of the North Atlantic States, succeeding T. C. Frame, chief engineer, Pennsylvania Highway Department, is E. DONALD STERNER **(below)** State Highway Commissioner of New Jersey. As executive of New Jersey's highway department, Commissioner Sterner has consistently advocated need of building safety into highways in form of divided roadways, adequate lighting and traffic signals and elimination of grade crossings and traffic bottlenecks.

Continental Photo


SAVE STEEL FOR SHIPS AND SHELLS
— The —
More Service You Can
Get Out of Your Wire Ropes,
the More Steel You Save for
Other Vital Uses

In the interest of our present National Emergency, we offer the following suggestions:

1. Keep your wire rope using equipment in good condition. Sheaves should be of proper size, design, material—and free from corrugations. Keep all sheaves and idlers properly lubricated and in line. Avoid excessive fleet angles.

2. Keep your wire ropes thoroughly and correctly lubricated.

3. Avoid kinks and sudden jerks . . . also, avoid cross-winding on drums, and reverse bends if possible.

4. Make sure your wire ropes operate with an adequate factor of safety. If there is not a proper ratio between the strength of the rope and the maximum load to be handled, the rope may be overstressed—a condition no rope can long survive.

5. Use wire rope of the correct size, construction, type and grade for your particular conditions.

The foregoing suggestions are necessarily brief. We shall be glad to give further particulars to any one interested.

A. LESCHEN & SONS ROPE CO.

WIRE ROPE MAKERS — ESTABLISHED 1857

5909 KENNERLY AVENUE — ST. LOUIS, MISSOURI, U. S. A.

NEW YORK	90 West Street	SAN FRANCISCO	520 Fourth Street
CHICAGO	810 W. Washington Blvd.	PORTLAND	914 N. W. 14th Avenue
DENVER	1554 Wazee Street	SEATTLE	3410 First Avenue South

JOHNSON BATCHERS

MATERIAL TIME AND LABOR SAVER

FOR 1-2-3 BAG MIXERS

WHIRLEY

A small batching plant, readily adaptable to any construction job, the JOHNSON WHIRLEY BATCHER used without a bin eliminates up to three laborers and wheelbarrows—used with a bin the shovelers and wheelbarrows can be dispensed with. By changing wheel position and substituting straight for circular track it can be converted to a Tramway Batcher in ten minutes.

TRAMWAY

The JOHNSON TRAMWAY BATCHER like the Whirley Batcher, to which it is convertible, makes simple the transporting and weighing of aggregates from stock pile to mixer. Two or three beam scale ends delay in weighing—over and under indicator assures accurate weight—all aggregates weighed and transported in one hopper.

BANTAM

The JOHNSON BANTAM BATCHER is the original small mixer weigh batcher—a standard weigh batcher reduced in size and supported on its own frame. Easy to move and operate—the BANTAM can be used on any job. Faster batching is possible than with platform scales. One shoveler is able to keep two or three wheelers busy.

BINS • BATCHERS • SCALES • CENTRAL MIX PLANTS
SILOS AND STORAGE BINS • BULK CEMENT EQUIPMENT
CONCRETE BUCKETS • BUCKET ELEVATORS
SCREW CEMENT FEEDERS • ROADBUILDERS' EQUIPMENT

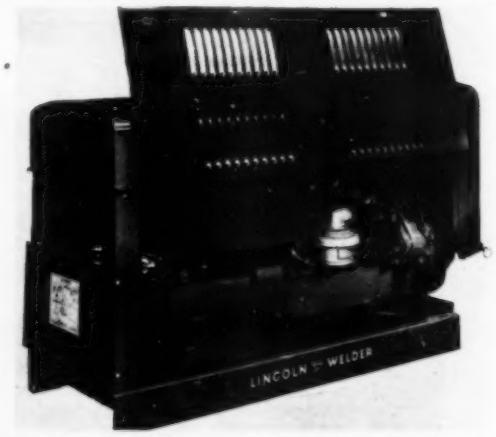
C.S. JOHNSON CO.
CHAMPAIGN ILLINOIS

CONSTRUCTION EQUIPMENT NEWS

RATCHET JACK of 15-ton capacity with 13¼-in. rise and height closed of 22½ in. has hinged base which permits tilting for such work as pulling poles, lifting vehicles and raising or moving heavy equipment and machinery. Double lever socket, chain-type cap and 5 ft. of chain with one lift and one grab hook are standard equipment furnished with jack. Other features: automatic lowering, conveniently located reversing lever, extra heavy base, toe lift for trackwork and other low lifting jobs.—**The Buda Co., Harvey, Ill.**

★ ★ ★

200-AMP. ARC WELDER of d. c. type with current range of 40 to 250 amp. has independent self-indicating voltage control and current control enabling operator to select arc and arc intensity to fit work. Open circuit voltage is varied by direct control of engine speed from 1,800 to 1,400 rpm. for welding duty. Welder delivers rated current of 200 amp. at 1,400 rpm. Voltage control may also be used to slow engine to idling speed of 900 rpm., saving fuel and engine wear. Machine is said to weld effectively nearly all metals and alloys with bare or coated electrodes or with carbon arc where desirable. According to manufacturer, it can be used for hardsurfacing worn parts and for welding light-gage metal, cast iron, structural members and machine parts. Powered by Hercules industrial engine. Stationary model shown weighs 890 lb. net and measures 56x37x20 in.—**Lincoln Electric Co., 12818 Coit Road, Cleveland, Ohio.**



HERE'S THE ENTIRE INJECTION SYSTEM OF THE HD-7 ENGINE

. . . the unit injectors that measure, inject and atomize the fuel, ***directly*** into the cylinders. That's why combustion is more complete, smoother . . . why starting is easier . . . why servicing and maintenance costs are cut . . . why 2-Cycle Diesels have earned the "rep" as the most simple, dependable engines on the job.

The unit injection system eliminates costly delays . . . factory servicing . . . delicate adjustments! No grief with leaky, clogged, or air-locked high pressure fuel lines . . . because there ***are no high pressure lines.*** No trouble with costly, troublesome fuel pumps . . . because there ***are no fuel pumps.***

Simplicity of design is carried throughout the entire engine so that Diesel experts are unnecessary . . . so that repairs or adjustments are seldom required . . . so that your job keeps running in high gear at all times. Any way you look at it you're ahead with 2-Cycle Diesel power—it offers you more value, more performance, more work for your dollar! Get the inside story of these remarkable engines in our booklet "Modern Tractor Power".

HELP BRING VICTORY

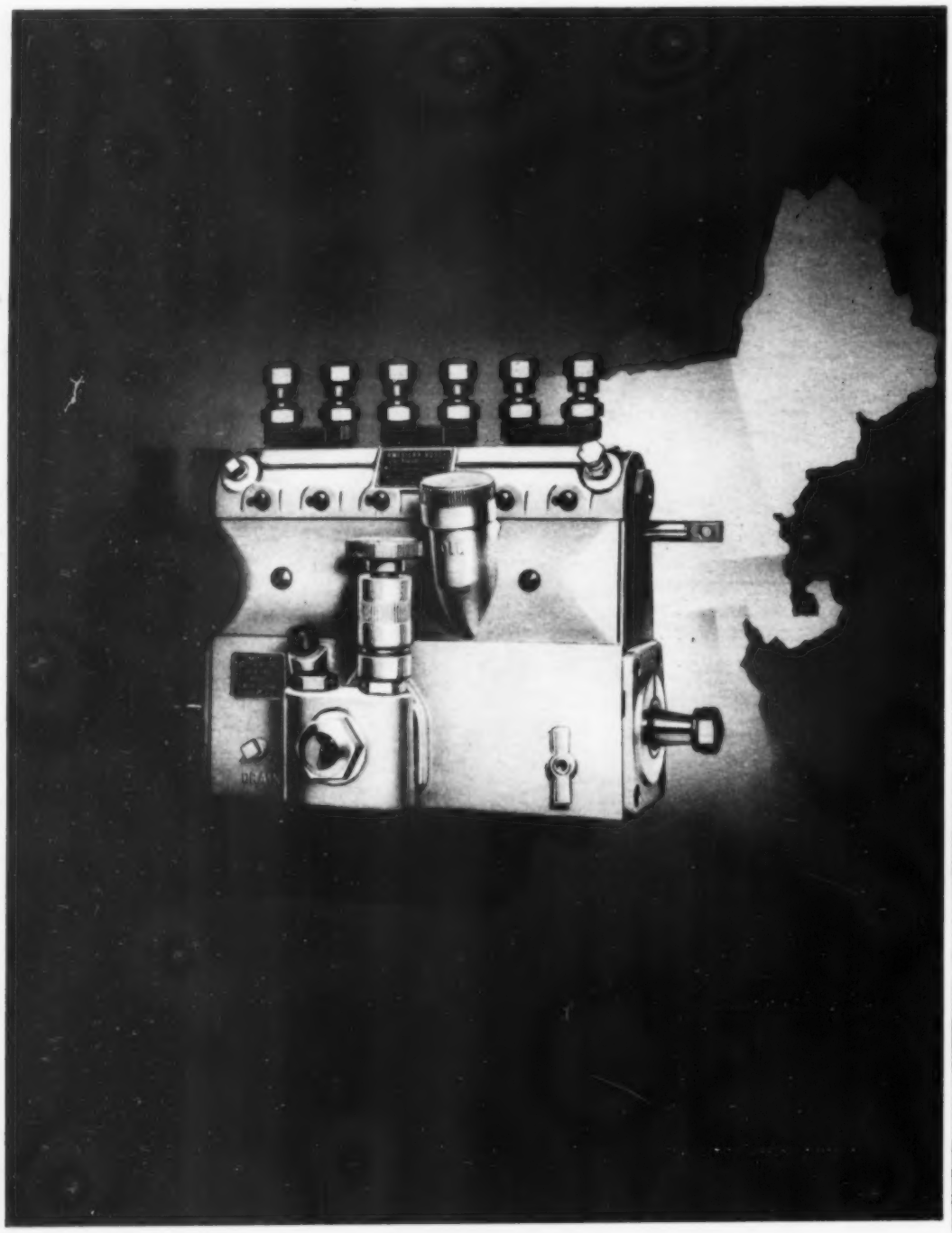
1. Extend the life of your present equipment . . . make needed repairs, replace worn parts. Your Allis-Chalmers dealer is prepared to give you A-1 service!
2. Sell your scrap! Your country is in urgent need of scrap!
3. Keep in touch with your Allis-Chalmers dealer . . . even if you have no priority rating. You may find good buys on used equipment.

ALLIS-CHALMERS
TRACTOR DIVISION · MILWAUKEE · U. S. A.

2-Cycle
THE MODERN DIESEL POWER

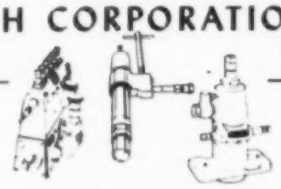
3 SIZES:
HD-7 • HD-10 • HD-14
60 TO 132 DRAWBAR H.P.

SYMBOL OF
NEW ENGLAND CRAFTSMANSHIP

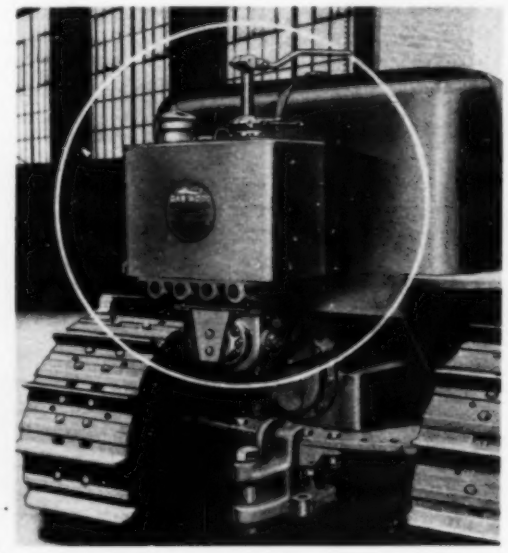


AMERICAN BOSCH
DIESEL INJECTION EQUIPMENT

AMERICAN BOSCH CORPORATION SPRINGFIELD, MASS.
BRANCHES: NEW YORK, CLEVELAND, DETROIT, CHICAGO, SAN FRANCISCO



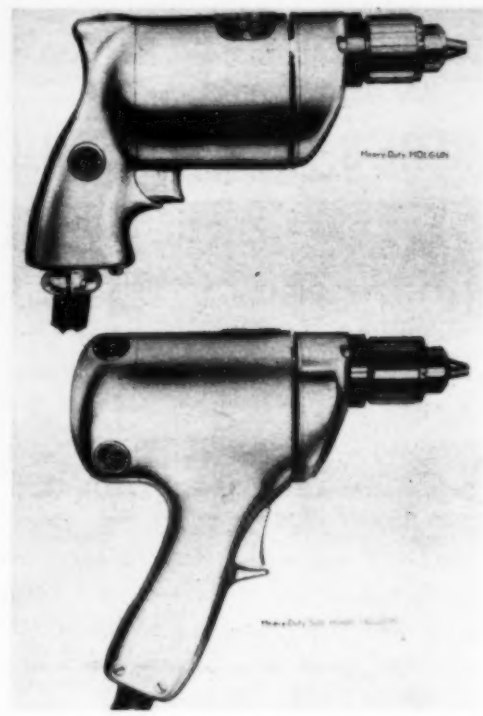
HYDRAULIC CONTROL UNIT for operating heavy-duty earth-moving machinery drawn by industrial type tractors converts mechanical power from tractor motor to flexible hydraulic power for transmission to hydraulic jacks on earth-moving scrapers, roadbuilders, bulldozers and rippers. Power for unit is taken from tractor motor through direct shaft connection to pump, either from transmission



shaft of tractor in rear or from motor crankshaft in front. Integral construction said to eliminate pipes, fittings and oil. Pump and valve working parts of high grade alloy steel. Parts subject to wear hardened and ground. Large oil tank provides greater oil supply and prevents oil from overheating. Ample oil passages throughout valve, pump and lines said to reduce oil flow resistance to minimum and to result in cooler operation and high efficiency. Two magnets in suction line of pump catch and hold metallic particles accidentally entering oil supply. Quick acting controls enable operator to handle them with minimum of effort and thus to devote more attention to operation of tractor.—**Gar Wood Industries, Inc., Detroit, Mich.**

★ ★ ★

HEAVY-DUTY ELECTRIC DRILL, both end and side handle models, is offered to aircraft and kindred industries to meet demands for powerful 1/4-in. unit especially engineered to heavy production require-



ments of airplane, aircraft accessories and similar fabricating and assembly operations. End handle model weighs 60 oz. and is 7¾ in. long. All units have two-pole instant release switches with pistol grip and trigger switch control suited either to right- or left-hand operation. Ball bearing throughout—**The Black & Decker Mfg. Co., 759 Penna Ave., Towson, Md.**

REMEMBER PEARL HARBOR

LOOK UP

. . . . . and thank GOD!

Those are our planes you hear roaring overhead, Mister! Our skies are our own, because builders of those planes get the steel they need. Many a ton of steel for Victory comes from builders and contractors, who have turned to Richmond for better concrete form-tying methods—and because—

Richmond makes 1 Ton of Steel Do the Work of 3 Tons

Patriotic, yes! Intensely practical too! For the "Richmond Way" is the profit-making way in any sort of concrete form work. First, Richmond Form-Tying Devices cost less to use than "home-made", "makeshift" wire, band or rod ties, fabricated on the job. Second, our free technical and estimating service gives your man on the job a complete plan of what's needed; what's to be done; and how, down to the last detail of location markings for each job section. Third, there's no money tied up in working parts, when you do business with Richmond. Richmond lends you Tylags, Tycones, Flat Washers, Tywrenches, etc. From Richmond you get a service; a system; a fully proved method by which to net many an extra dollar; by which to gain recognition as doing something vital for Victory. Figure it out for yourself. We'll give you figures and facts.

Ewing Galloway

We Sell All Types...We Recommend Only Prefabricated Ties...They Cost Less!

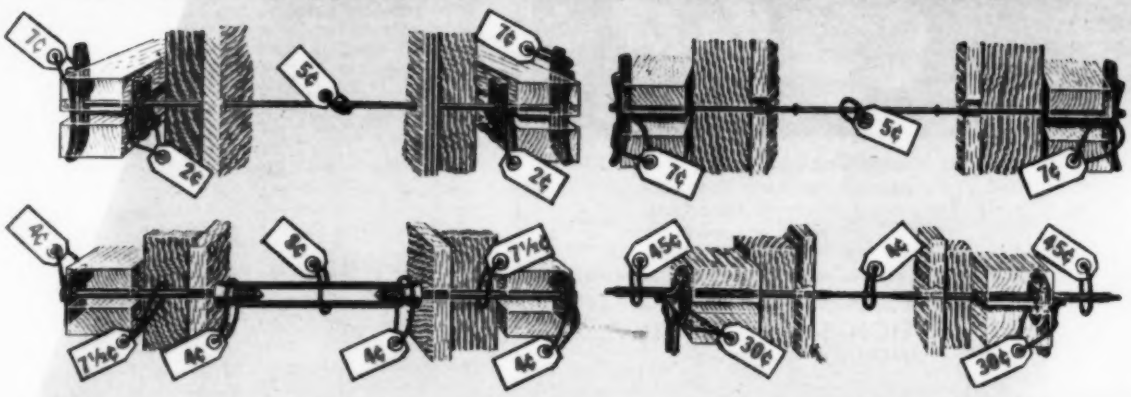


Figure it for yourself!
HERE ARE THE PRICES*

ALL PRICES F.O.B. BROOKLYN, N. Y.
*BASED ON A 12" CONCRETE WALL

RICHMOND SCREW ANCHOR CO., INC.

816-838 LIBERTY AVENUE • BROOKLYN, N. Y.

TIME AND LABOR SAVING CONSTRUCTION DEVICES FOR CONCRETE CONSTRUCTION

Reduce Evaporation Losses . . . . . at Powder Plants by Storing Ammonia in HORTONSPHERES

The oil industry has, for two decades, been storing volatile liquids in Hortonspheres to prevent excessive evaporation losses. It is only natural, therefore, to find them at almost every munitions plant.

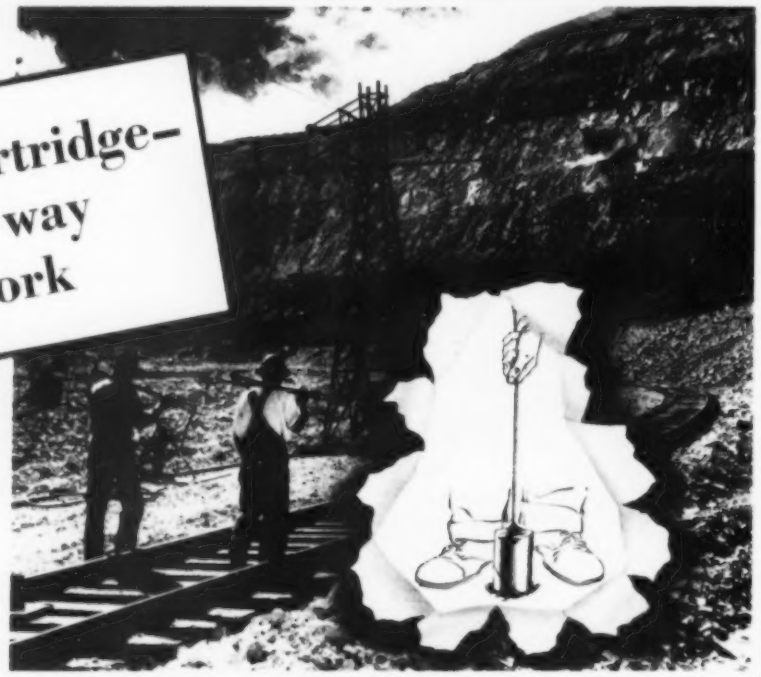
The two Hortonspheres at the right are used to store ammonia under 50 lbs. per sq. in. pressure at a chemical plant making explosives. They hold 2,500 bbls. each. Other standard sizes range from 1,000 to 20,000 bbls. capacity.

CHICAGO BRIDGE & IRON COMPANY

BIRMINGHAM · CHICAGO · CLEVELAND · DETROIT · HAVANA
NEW YORK · PHILADELPHIA · SAN FRANCISCO · TULSA · WASHINGTON

Plants at BIRMINGHAM, CHICAGO and GREENVILLE, PA.

Primed cartridge— on its way to work



Greater force is centered around the primer cartridge. When Primacord is used *every* cartridge is a primer cartridge! . . . because the Primacord, attached to the cartridge, at the bottom of the hole, is in contact with every cartridge in the load.

Insensitive to fire, friction and ordinary shock, Primacord must be *deliberately* detonated by fuse and cap or electric blasting cap. Once released, a powerful detonating wave travels at the rate of 3.85 miles a second! . . . exploding cartridges in every hole in the network practically instantaneously. Tremendous shattering force is created, resulting in better fragmentation, easier removal.

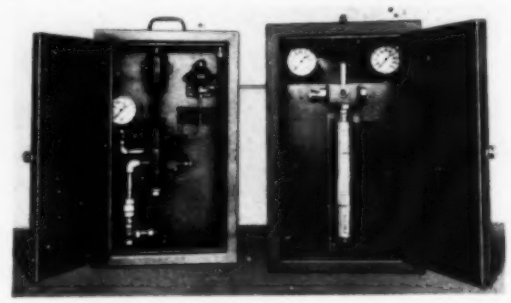
Primacord may be used on large blasting jobs and small. Try it on your next job.

THE ENSIGN-BICKFORD CO.
SIMSBURY, CONN.
Manufacturers of Safety Fuse since 1836

PB-44

PRIMACORD-BICKFORD DETONATING FUSE

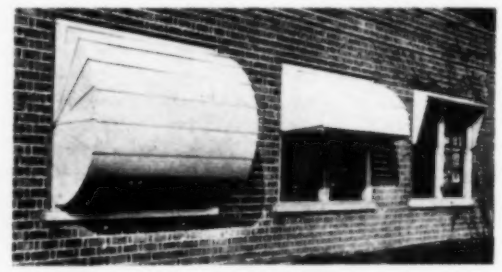
PORTABLE CHLORINATING UNIT for emergency service is said to provide well diffused solution feed wherever there is available source of water of sufficient pressure to operate an injector. Other conditions met by gas feed. In either case, rate of application is accurately maintained by compensator control which overcomes effect of pressure



changes in chlorine cylinder. Unit available with orifice meters for standard capacities of 25, 75, 150 and 300 lb. per 24 hr. solution feed and 25 and 75 lb. per 24 hr. direct feed. Rates of feed within these capacity limits may be adjusted over 7 to 1 range. Equipment supplied in three cases for convenient portability: (1) meter device and compensator; (2) injector and check valve assembly; (3) accessories and tools for making connections. In operation cases may be set on table or bench or hung on wall or pipe stand.—**Wallace & Tiernan Co., Belleville, N. J.**

★ ★ ★

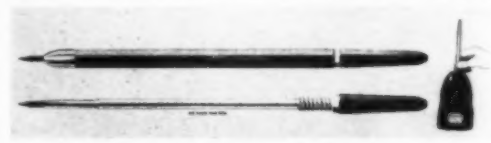
BLACKOUT METAL AWNINGS, offered as practical answer to blackout problem, are installed on exterior of building and operate as simply as old-time roll-top desk. For sunlight protection they are lowered half way. For complete blackout awning is fully lowered. To conserve space when raised, its segments of "galvannealed" steel nest together in



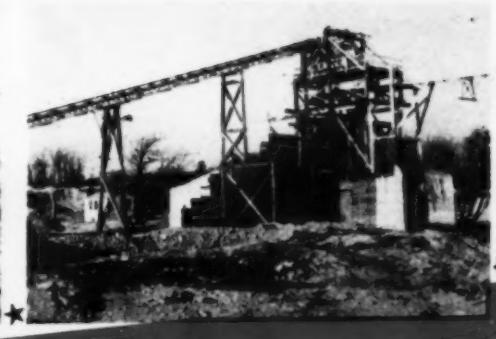
telescopic fashion. Each segment sealed from other by lightproof, noise-absorbent gasket. Entire awning said to be rustproof and fireproof and can be provided with inside lock. Besides assuring complete blackout control and protection of glass from blasts and flying splinters advantages claimed are: elimination of reflection from moon and other night lights; permanence of installation; no restriction of ventilation; neatness and attractiveness of appearance; after-war value in sunlight protection and safeguarding against theft.—**Acklin Stamping Co., Toledo, Ohio.**

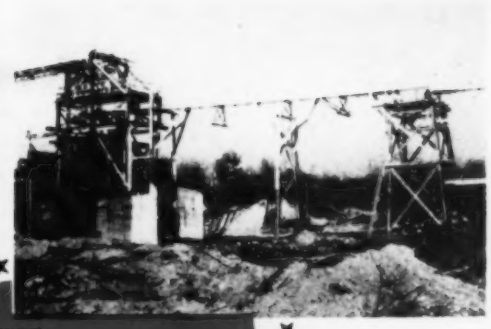
★ ★ ★

MECHANICAL DRAFTING PENCIL with motor-driven lead pointing machine has full length spring brass lead tube which is driven downward into chuck point by screw-operated mechanism providing positive grip on lead and preventing slippage or wobble. Flexible "squeeze action" of new mecha-



nism claimed not to mar or ring leads, causing them to break. Pencil barrel of lightweight Tenite is said to be perfectly balanced and to have feel of full length wood-incased pencil. Motor-driven lead pointer starts and stops automatically and provides needle-like drafting points in few seconds, eliminating pointing with file or sand pad. Pencil also made in double-end type, enabling draftsman to carry two different degrees of lead on one holder, or lead in one end and scriber in other. For use with these pencils is provided drawing leads in nine degrees of hardness.—**TEC Pencil Co., 9381 Olympic Blvd., Beverly Hills, Calif.**



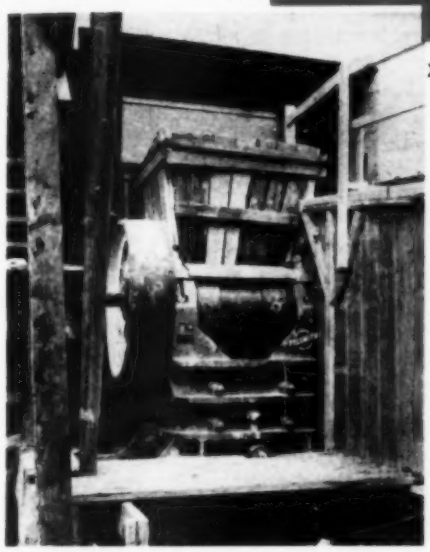


250 TONS PER HOUR

Keeps War Construction Moving

Crystal Concrete Co. of South Braintree, Mass., has another Telsmith gravel plant. This new one, near Weymouth, was erected solely to supply war projects. Production was started at the rate of 175 tons per hr. After a short "breaking-in" period, regular production will go up to 200 to 250 tons per hr. In the pinch . . . when win-the-war work calls for top speed and peak production . . . experienced operators depend on Telsmith equipment. You can, too. It will pay you to get Bulletin G-10.

TELSMITH

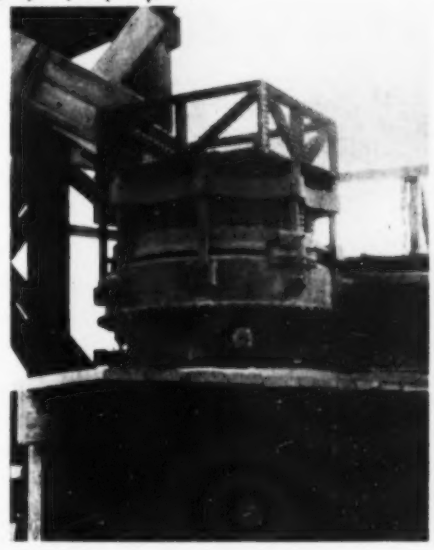


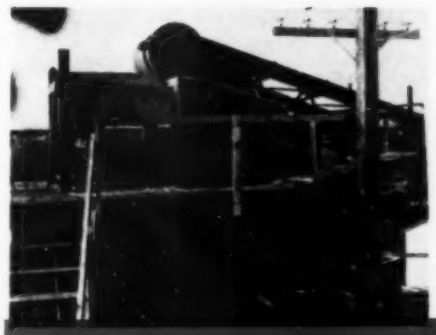
Telsmith 18 x 30 Roller Bearing Jaw Crusher (left) handles plus 3¼" material. It is fed by Telsmith 30" x 5'6" Reciprocating Plate Feeder over a Telsmith No. 450 Rotary Grizzly with 3¼" spaces. Feeder takes raw bank material from 15 cu. yd. hopper fitted with a rail grizzly to reject the few oversize boulders. Crushed material, and minus 3¼" from Rotary Grizzly are conveyed to scalping screen (lower left).

Telsmith 4' x 10' Single Deck Pulsator (lower left) acts as a scalping screen. Minus 2" throughs go to finished product conveyor; plus 2" oversize into Gyrasphere Crusher (right).

Telsmith No. 36 Gyrasphere (upper right) crushes oversize or plus 2" fed to it from the Telsmith Scalping Screen (left). The crushed product is returned to the 30" x 87' primary conveyor by an 18" x 48'6" belt conveyor.

Telsmith 5' x 12' Triple Deck Pulsator (right) in structure over storage piles, sizes the gravel and sand. The 3 sizes of washed gravel are deposited over tunnel at grade level for truck loading from live storage, or by loader outside stock piles. The sand is flumed to a No. 8 Telsmith Sand Tank independent of main structure, for stock piling. G-9





SMITH ENGINEERING WORKS, 510 E. CAPITOL DRIVE, MILWAUKEE, WISCONSIN

Cable Addresses: Sengworks, Milwaukee—Concrete, London

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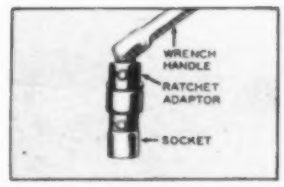
A LEFT-HANDED MONKEY WRENCH MIGHT NOT HAVE BEEN A BAD IDEA

• Listen, Mister, the fellow who originated that "crack" had something. A man with a big-jawed open-end or ordinary wrench has to be a regular cortortionist — the way nuts and bolts are often hidden in the darndest tight spots. Even if he can reach 'em, he can't get a firm hold, so what happens — short, time-wasting bites, rounded nut corners, slips and barked knuckles. But, that's ended now with the new-type, quick-detachable *Blackhawk Socket Wrenches.*

There's a *Right* Blackhawk Socket Wrench to Speed Up Every Maintenance Job

Blackhawk *interchangeable* sockets, extensions, handles and ratchets give you new and startling developments for speed, safety and efficiency. They click together to make *just the right* combination for proper leverage and clearance on any job for a wrench, no matter how tough! Save valuable time and eliminate need for many special tools. For the last word on solving nut and bolt problems requiring wrench openings of 3/16" to 3½", call your Blackhawk Industrial Distributor — or write us for free copy of 48-page "HANDY GUIDE," describing the full line-up of 185 sockets, handles, attachments, box-wrenches and specialties.



New Adaptor Makes a Ratchet of Any Socket Wrench Handle
A typical Blackhawk time and knuckle-saver. Fits in between socket and handle—converts any handle into a fast working ratchet. Used with tension wrenches, hinged offsets and handles, it gets you into cramped quarters, recessed spots and corners where regular ratchets can't work.

Avoid Injury and Damage from Falling Sockets
Blackhawk's exclusive, patented Thumb Release "LOCK-ON" feature makes it impossible for sockets to slip or drop off accidentally — to become lost and damage mechanism.

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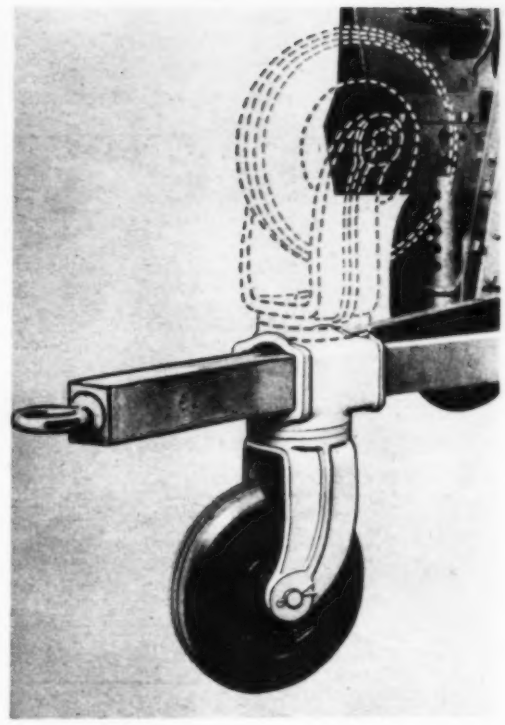


SWIVEL THIRD WHEEL for two-wheel tractors, available for Construction Machinery Co.'s mixers now in field, is equipped with valveless pneumatic puncture-proof tire. Runs on roller bearings. Heavy malleable iron bracket. Quickly reversed on tongue and turned up out of way when not in use. Makes it easier to handle mixers on job.—**Construction Machinery Co., Waterloo, Iowa.**

★ ★ ★

IMPROVED DRIFTER DRILL is said to have 34 percent greater efficiency than previous 4-in. bore machines, based on inches drilled per cubic foot of air at 90-lb. pressure and 52 percent greater at 70-lb. pressure. Features: (1) Wall section of front head is 10 percent thicker, shank aligner is 18 percent longer and 8 percent thicker than previous

models; (2) improved chuck design of heavier construction; (3) piston-stem cushion bearing permits heavier metal section in cylinder and furnishes better support; (4) port on each side of cylinder balances piston within cylinder; (5) air to front end of cylinder passes directly between ratchet and head of rifle bar, unrestricted by small ports, assuring good hole cleaning and aiding in supplying constant lubrication to all moving parts. Drill employs sturdy rifle bar, said to make possible strong rotation. Rifle bar pawls reversible for longer life. Throttle handle more readily accessible and well protected by backhead so that it cannot be broken easily.—**Ingersoll-Rand Co., 11 Broadway, New York City.**

Above: Digging Drainage Ditches near Latimer, Pennsylvania. Model HT-60 Heil Trailbuilder and Model D Cletrac.
Above, Left: Building a New Approach Road for a Mining Co. near Aspen, Colorado. Model HT-60 Heil Trailbuilder and Model D Cletrac.

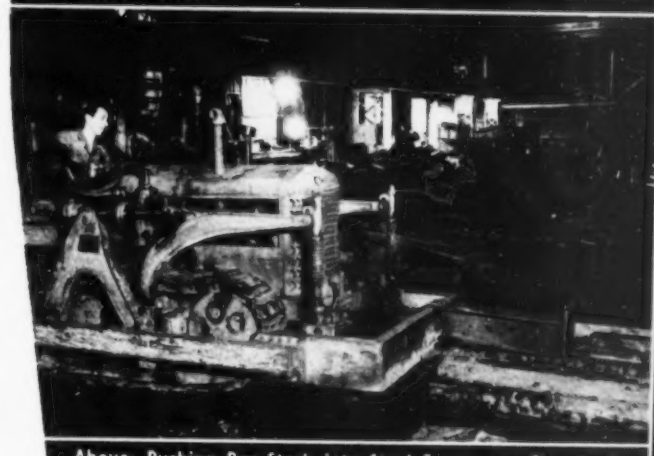
Rely on HEIL HYDRAULIC TRAILBUILDERS AND BULLDOZERS for fast, Dependable Work

Immediate Delivery on Heil Trailbuilders and Bulldozers for All Cletrac Tractor Models!

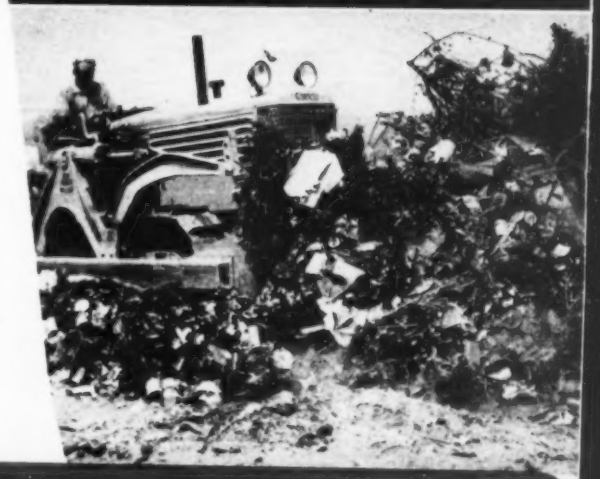
Tractors equipped with Heil Trailbuilders and Bulldozers are flexible, all-purpose earthmoving units that give you increased production and lower costs on a wide variety of dirtmoving and construction jobs. Powerful, hydraulically-controlled Trailbuilders and Bulldozers provide faster, more efficient operation in clearing land—or digging, filling, spreading, or leveling any kind of material.

Hydraulic pressure holds the blade down into the cut and insures clean-cut, positive digging action . . . Large diameter hydraulic cylinders permit the use of low hydraulic operating pressures . . . Correct balance and weight distribution give full power on the tracks in any blade position . . . Sturdy, box-section construction provides maximum strength for tough digging conditions.

An investment in a Heil Trailbuilder or Bulldozer for your present tractor equipment will increase its value, utility and efficiency. Act now, while you can still get immediate stock delivery of Heil Bulldozers and Trailbuilders for any Cletrac Tractor. See your nearest Heil distributor—or phone, write or wire us, today.



Above: Pushing Bar Stock into Steel Furnace at Cleveland, Ohio Plant. Special Model HB-25 Heil Bulldozer and Model D Cletrac.
Below: At the Columbus, Ohio, Garbage Disposal Plant. Model HT-60 Heil Trailbuilder and Model D Cletrac.



Heil Hi-Speed Tractor-Scoop. 150 H.P. Rubber-Tired Heil Diesel Tractor with 15-Yd. Capacity Heil Cable-Operated Scoop.

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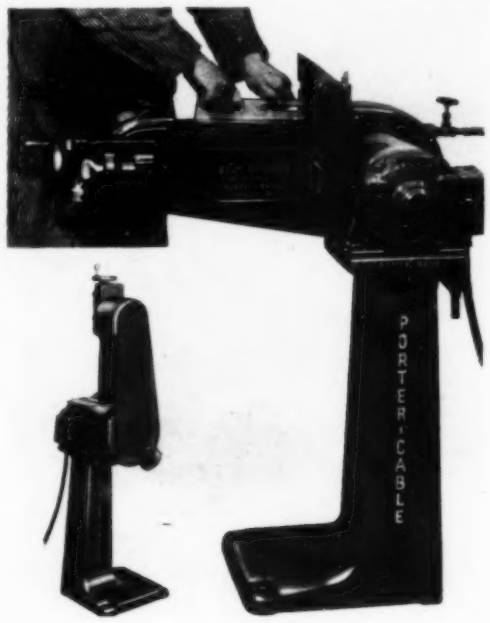
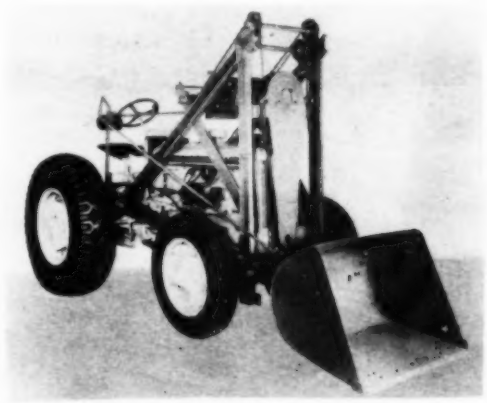


that it may be used either with dry belts or with new type resin-bonded abrasive belts on which water or other cooling liquid is sprayed. Ball-bearing, totally inclosed motor, ¾-hp., 1,725 rpm., directly connected to drive pulley of grinder, gives speed of 3,400 surface ft. per min., traveling over flat 4x10-in. backing plate, allowing working surface of 40 sq.in. Two hand adjustments said to simplify application, removal and alignment of abrasive belts. Removable side guard exposes entire interior. Unit mounted on cast-iron pedestal, light enough for portability. Removal of three bolts permits position change from vertical to horizontal or even horizontal with belt underneath. Slotted rest table adjustable to 45-deg. angle. — **Porter-Cable Machine Co., Syracuse, N. Y.**

★ ★ ★

FRONT END LOADER for wheeled-type tractors for rehandling of loose material and for moderate excavating, has extensible boom which allows bucket to be close up to tractor front wheels when digging, but when bucket is raised, permits it to travel upward and outward, discharging its load 2 ft. away from tractor. Material thus may be deposited into highest standard truck body, distributed without



hand spreading or emptied at any point in its lift. Built for mounting on Case or International wheeled tractors. Power is taken from front end of tractor, making loading operation independent of tractor movement. Tractive force transmitted from rear axle to bucket through movable booms. Separate clutch and brake are part of loader apparatus, controlled by two levers convenient to driver. Standard bucket is ½ cu.yd. capacity, but larger buckets are available for light material, such as snow. Load limit of 1,200 lb. is advised by manufacturers.—**White Manufacturing Co., Elkhart Ind.**

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In *Typical Designs of Timber Structures* we have grouped the plans of 45 representative types of structures that have been engineered with TECO Connectors.

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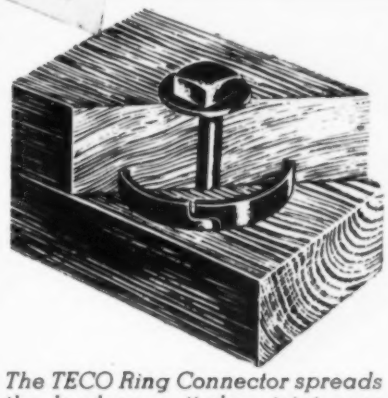

The TECO Ring Connector spreads the load on a timber joint over practically the entire cross-section of the wood . . . brings the full structural strength of lumber into play.

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Those Red-Handled RAZOR-BACKS you see everywhere speed up work, slow down replacements

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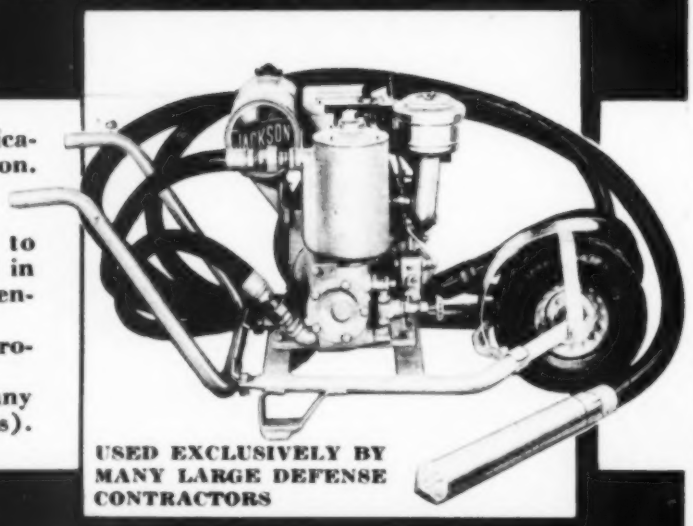
Automatic pressure lubrication—requires no attention.
34-ft. hose—2¾" vibrator head.
Adjustable frequency to 6800 R.P.M.—submerged in concrete. Powerful gas engine—4.7 H.P.
Long lived, ball-bearing, rotary, hydraulic pump.
(Used exclusively by many large defense contractors).



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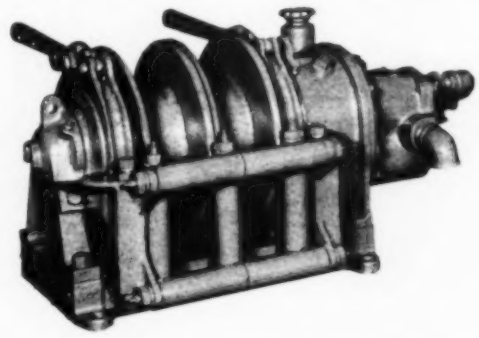
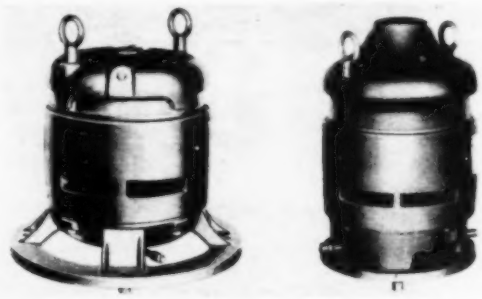
SCRAPER-HOIST is said to be suitable for handling small jobs, for operation in close quarters, for handling ore in preliminary rounds or sub-level drifts, for short cleanup jobs in isolated workings, for mucking out short cross-cuts, for handling waste fill and for performance of similar operations formerly done by hand. Unit is 27 in. long and passes through 12x14-in. opening. Weight, 250 lb., less rope guides. One-man machine for most operations. Rope speed of 125 ft. per min. developed through Turbinair motor. Rated rope pull, 1,000 lb. By speeding motor and suddenly applying clutch, unit is said momentarily to pull more than twice this load.—**Sullivan Machinery Co., Michigan City, Ind.**



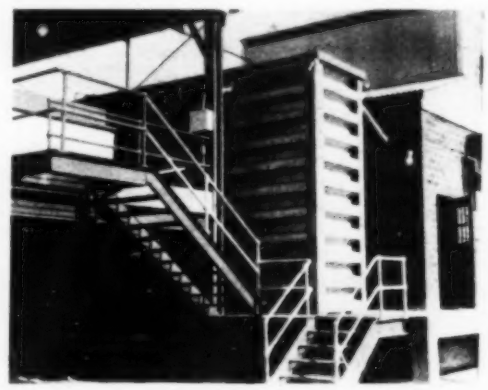
★ ★ ★

VERTICAL MOTORS of general-purpose and shielded types have been added to G-E Tri-Clad line. Shielded motors are especially fitted to pumping applications. At right in illustration is shielded polyphase motor, furnished in sizes of 1 to 20 hp. with either solid shafts or hollow shafts. Shielded single-phase motors are available in sizes of 1 to 5 hp., solid shafts only. Both shielded types are for normal-thrust or high-thrust applications. These motors are suitable for outdoor operation except where extremes of moisture, dust or other harmful agents make fan-cooled motors more economical. Hollow shafts facilitate installation and impeller adjustment in pump assemblies. At left in picture is general-purpose polyphase motor with frame and cover designed to give added protection without increasing overall height. Variety of bases accommodates this motor to many mounting requirements. General-purpose motors are suitable for agitators, mixers and similar applications.—**General Electric Co., Schenectady, N. Y.**



★ ★ ★

BIN-TYPE BARRICADES built up to any required height with prefabricated metal columns, stringers and spacers bolted in place and filled with earth or sand are used at ordnance plants to localize



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THE SAFETY CLIP FIST-GRIPS WIRE ROPE

The finger-pinch of the U-Bolt on wire rope bites and crushes the strands — breakage is possible when the bowed rope takes tension and whipping.

Use the *Fist-Grip* Safety Clip, that holds rope straight and round. Its four flat bearing surfaces act like a *fist* of drop-forged steel.

Inexperienced or rushed workers can't put it on backward — both halves are identical — no possibility of dangerous mistake.

95% rope efficiency is delivered by test — far greater than the U-Bolt Clip.

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No rope bowing or crimping
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No special wrench
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Bolts on opposite sides
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Can't go on wrong
ACCIDENTS SAVED

Fewer clips needed
CLIPS SAVED

Fewer rope breaks
ACCIDENTS SAVED

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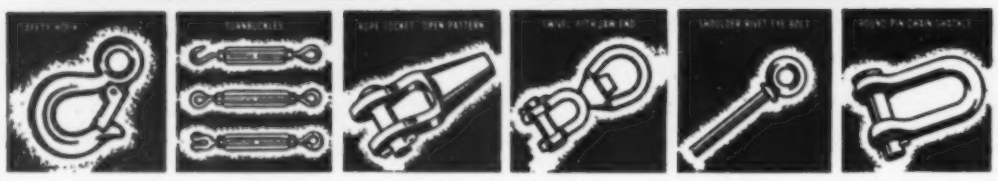
THE THOMAS LAUGHLIN COMPANY
PORTLAND, MAINE



damage from possible explosions. Similar barricades have been suggested for protection against bomb splinters at air-fields and other strategic locations. Bins can be erected and dismantled by unskilled labor.—**Armco Drainage Products Association, Middletown, Ohio.**

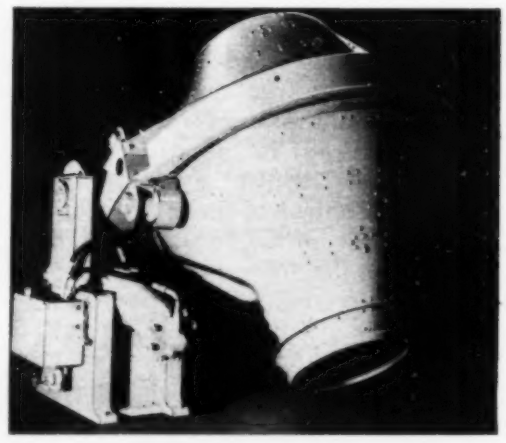
★ ★ ★

TWO-WAY COMMUNICATION SYSTEM accommodating from two to 70 stations broadcasts paging messages originating at any station through trumpets at all other stations and establishes two-way conversation as soon as man being paged picks up

hand telephone set at station nearest to him. While handsets are in use, all trumpets are silenced and busy-signal light flashes continually at all stations. Conferences among several men at various stations are possible by broadcasting names of all men wanted. Lifting handsets at stations establishes two-way communication among all those participating. Simple point-to-point wiring is said to make installation easy. System is useful for broadcasting messages and alarms.—**Executone, Inc., 415 Lexington Ave., New York, N. Y.**

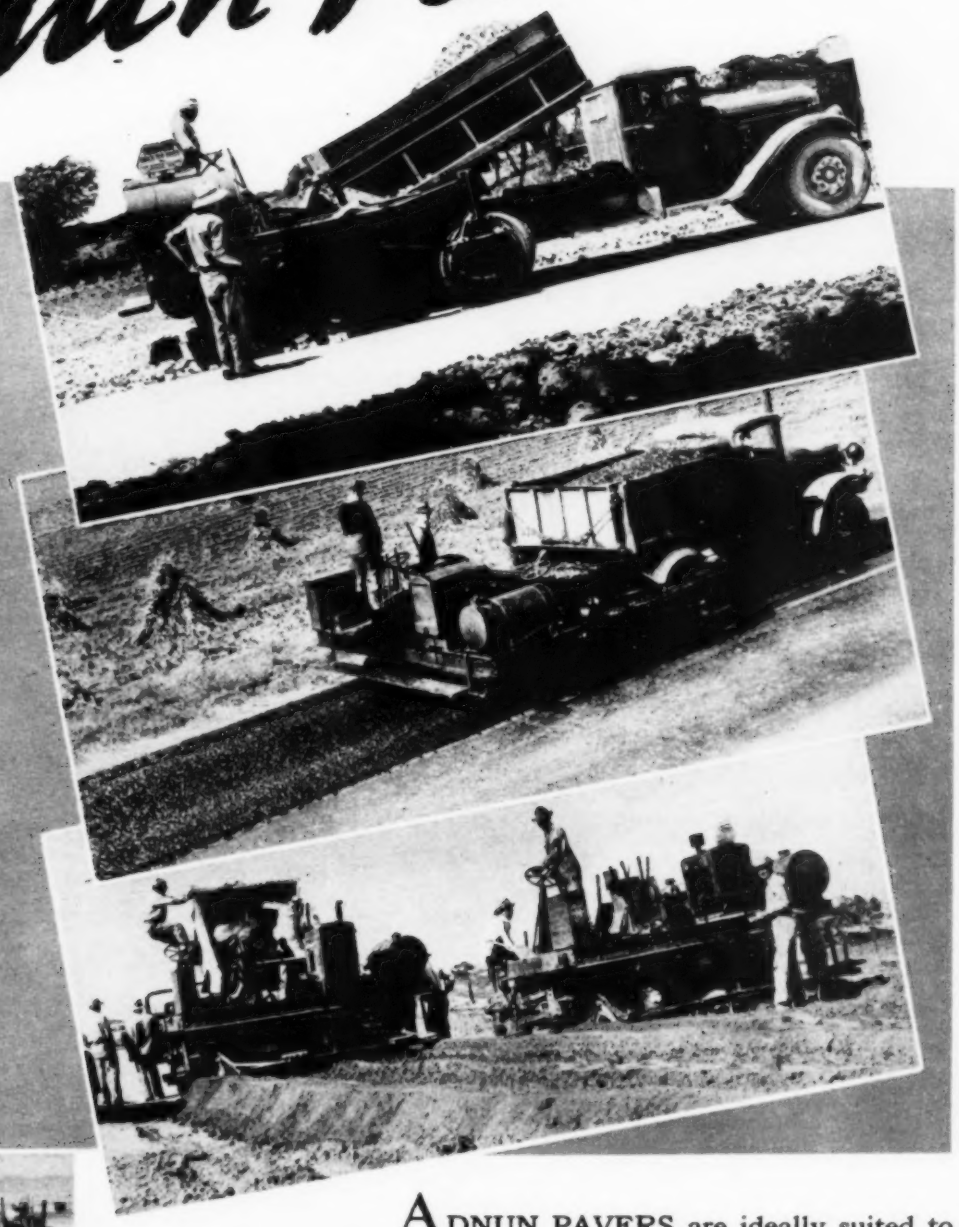
★ ★ ★

TILTING MIXERS of 4-yd. capacity for TVA's Fontana dam are front-end-charging type fed by one set of batchers and discharging concrete into central hopper. Each mixer includes these features: all-welded box girder pedestals and tilting frame;



60-deg. drum tilt with automatic pneumatic tilting unit; direct-connected 75-hp. electric motor drive; fully inclosed, machine-cut spur gear transmission unit with splined, alloy steel shafts; heat-treated high carbon steel roller track, drum gear and pinion with machine-cut teeth; forged, heat-treated edge rollers and main rollers.—**T. L. Smith Co., Milwaukee, Wis.**

Adnun Pavers



for SPREADING ROCK

Laying a base course of heavy rock for a water-bound macadam road with a standard Adnun Paver. Capacity up to 100 tons per hour and more.

for BLACK TOP PAVING

Any black top surface, hot or cold, can be laid at a rate of 1,000 tons or more per day with an Adnun Paver. Pavement illustrated is typical.

for SPREADING SOIL CEMENT

Two Adnun Pavers putting down a *15 inch course* of soil cement which requires spreading full width of road at one time.

Laying Black Top runways on huge airport expansion.

ADNUN PAVERS are ideally suited to practically all types of road surfacing except cement concrete. They provide high output, economical use of materials and a surface smoothness practically impossible to obtain with other methods. Only Adnun Pavers have Continuous Course Correction that levels out surface irregularities with each succeeding course. And these Adnun advantages mean lower costs, faster work:

Sturdy construction that endures hard service . . . The power cut off — no tag end runouts . . . Power to handle the heaviest truck . . . Hydraulic controls — Overlapping action Cutter Bar — makes a perfect joint under pressure . . . Full adjustment for bank and wedge courses . . . Capacity to over 1,000 tons a day. *Write for catalog.*

THE FOOTE COMPANY, INC., Nunda, N. Y.

ADNUN BLACK TOP PAVERS **MULTIFOOTE** CONCRETE PAVERS

WHERE DURABILITY IS VITAL

Rugged and husky, Diamond Roller Chain Drives used on construction machinery are nevertheless as accurately made and as smooth running as those used on the finest precision machinery.

Consisting of a series of roller bearings—they flow power from engine to shaft or shaft to shaft with roller bearing smoothness and efficiency. The hardened roller parts are heat treated for wear resistance, and the tension members are treated to insure high tensile strength. There is no compromise in Diamond Roller Chain design.

Not depending on friction they are easy on the machinery bearings,—they waste no power, require minimum space, and have the durability and reserve power to withstand long periods of heavy going without slip, creep or stretch, nor loss of efficiency.

Leading manufacturers regularly use Diamond Chains because of their proven performance—good reason to insist on Diamond for any of your drive requirements or replacements. DIAMOND CHAIN & MFG. CO., 418 Kentucky Avenue, Indianapolis, Indiana. Offices and Distributors in All Principal Cities.

DIAMOND ROLLER CHAINS

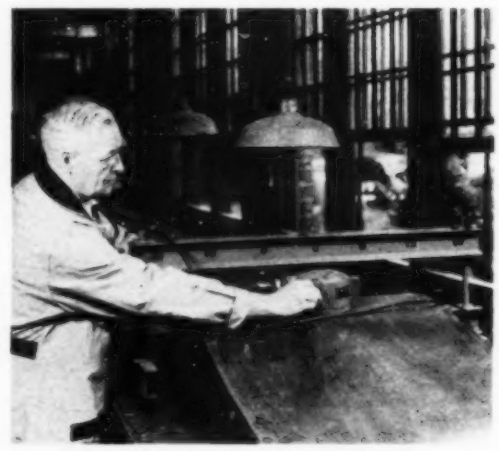
Six-strand Diamond Roller Chain drive on large construction crane. Driver sprocket, 25 teeth; driven sprocket, 69 teeth.

INSULATING BOARD OF GLASS FIBER, inclosed in a sheathing of asphalt, is new product developed for insulating roof decks of industrial buildings and as a replacement for cork, now difficult to obtain from Spain and Portugal because of war conditions, for use in cold storage plants. Named Fiberglas AE (asphalt inclosed) Board, insulating slabs are made of pure glass fibers treated with a binder and compressed to a density of 6 lb. per cu.ft. and have a low heat conductivity. Applied to roofs of

industrial buildings the board, which is fireproof and immune to rot, decay or fungus growths, retards passage of heat, thereby cutting down fuel costs, and prevents condensation on underside of roof deck. The board, weighing slightly less than cork, is made in a standard size of 12x36 in. and in thicknesses of 1, 1½ and 2 in., with square edges and corners. Asphalt coating, providing waterproof seal around Fiberglas insulation core, is thoroughly sanded to prevent adhesion between blocks during shipment or when in storage. Board can be cut with an ordinary saw lubricated with kerosene to prevent asphalt coating from gumming teeth. Where multiple layers of insulating board are used, panel units are bonded to each other by treated wood skewers; prior to application to walls, partitions or ceilings, board is dipped in hot asphalt and then pressed into position. Costs are same as for cork insulation. Panels are suitable for load-bearing service to carry floors in refrigerated spaces or as promenade surfaces on flat roof decks.—**Owens-Corning Fiberglas Corp., Toledo, Ohio.**

★ ★ ★

BELT VULCANIZER is now designed with square instead of diagonal end, making it possible to cure wider belts. Widths of 34 in. can be cured with Vulcanizer placed at right angles across belt. By



placing it at 22-deg. angle, 28-in. belt may be cured; at 30-deg. angle, 24-in. belt may be cured and at 45-deg. angle 16-in. belt may be cured. New in. and overall height of 23½-in. Weight 380 lb. complete with sheet iron platen covers, curing pad and two 25-ft. lengths of extension cord.—**B. F. Goodrich Co., Akron, Ohio.**

"Gulf Lubricants and Fuels make a big difference on a tough job"

*Says highway contractor**

* Fred Berlanti and Son, Inc., Harrison, New York, have a 6½-mile road construction job in Lebanon and Berks Counties, Pennsylvania. Gulf quality lubricants and fuels are helping this contractor secure efficient, trouble-free performance. The modern equipment employed includes compressors, drills, scrapers, shovels, ditchers, bulldozers, and trucks.

"Mud or dust, hot or cold, we get top-notch performance from our equipment and extra hours of trouble-free operation with Gulf products."

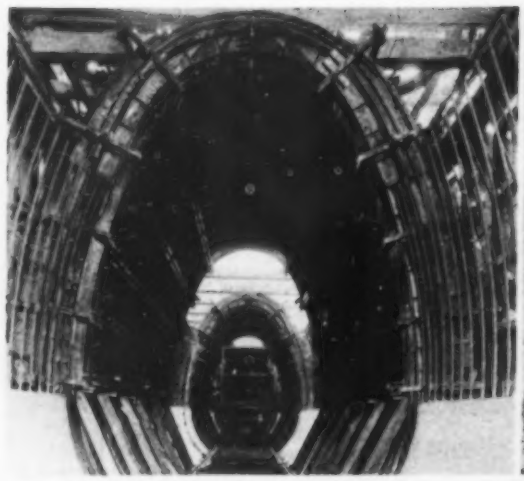
"ALL-WEATHER protection with Gulf lubricants and the uniform high quality of Gulf fuels are playing a big part in our rapid progress on this job," says Louis Berlanti, President. "In spite of day-to-day changes in operating conditions, our equipment is performing at top-notch efficiency, and we have avoided delays caused by mechanical troubles."

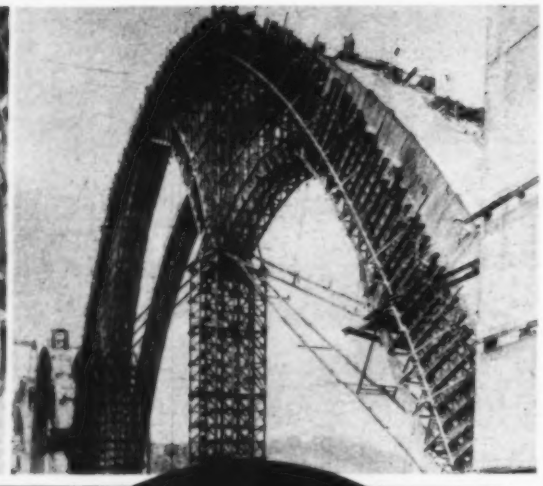
You get these three advantages when you use Gulf products: First, an experienced Gulf engineer recommends—on the job—the proper types and grades for each requirement. Second, you're *sure* of getting lubricants exactly suited to your equipment and to your operating conditions—for the Gulf line includes over 400 quality oils and greases. Third, Gulf's wide distribution through more than 1200 warehouses, located throughout 30 states from Maine to New Mexico, insures prompt delivery, no matter how remote the job.

GULF

Write or 'phone Gulf now and arrange to use Gulf higher quality lubricants and fuels on your next job. They will help you complete it more quickly and at a bigger profit.

GULF OIL CORPORATION · GULF REFINING COMPANY · PITTSBURGH, PA.





for Speed in Construction

The rapid progress of engineering construction has naturally influenced the design of Blaw-Knox Steel Forms with respect to their general application and operation.

The engineering facilities and services extended by Blaw-Knox form engineers are prized by all who have taken advantage of them. These services are offered in the interest of engineering progress and are free from any charge or obligation.

BLAW-KNOX STEEL FORMS

BLAW-KNOX DIVISION
of Blaw-Knox Company
Farmer's Bank Bldg. Pittsburgh, Pa.
New York Chicago Philadelphia Birmingham

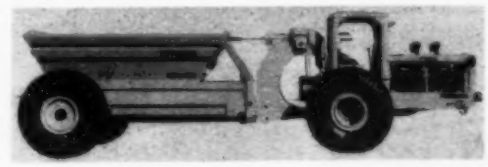
IN YOUR RACE WITH TIME . . .

Graco Convoy Lubers will help you reach the finish line "fustest" with the "mostest" equipment in "fighting trim". Guts, stamina, and military efficiency are built right into Graco Convoy Lubers to give you the finest available facilities for automatic, power lubrication of trucks, tractors, and construction equipment *on the job*. Air compressor, grease pumps, hose reels, and all accessories are completely assembled at the factory and rigidly mounted on a structural steel frame. It takes only a few minutes to mount the complete unit on your truck and put it to work. Write today for details and specifications.

GRACO

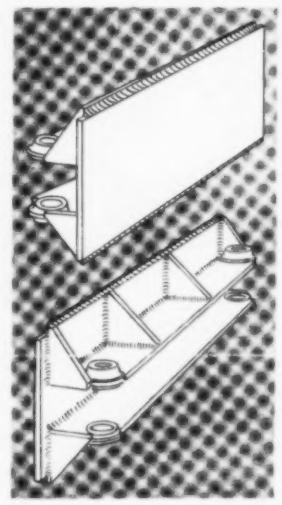
GRAY COMPANY, INC.
Minneapolis, Minn.

HAULING UNIT, called W210 Tournatrailer, designed for use with Super C Tournapull, has heaped capacity of 17 cu. yd. and is built with flared sides and end walls to give bowl an 8 ft. by 12 ft. 8 in. opening at top for quick, accurate loading by dragline or shovel. Tournapull has four forward speeds 2.6, 4.4, 8.1 and



14.3 mph. and reverse speed of 2.2 mph., providing travel speeds for all jobs. Tournatrailer rides on two 21.00x24-in. 20-ply tires, and has these additional features: self-cleaning, sliding bowl that permits end-dumping or spreading in layers from 1 in. to 36½ in. in depth; 21-in. external hydraulic brakes lined with 300 sq.in. of woven braking surface for positive stopping; special analysis steel and box-beam construction to assure strength with light weight; cable-operated from double-drum power control unit. —**R. G. Le Tourneau, Inc., Peoria, Ill.**

★ ★ ★



PUSH DOZERS and push-dozer pads are now being built in two sizes 24x61 in. for Allis-Chalmers HD14 and HD-10-W tractors, International WTD 18 and WTD 14 tractors and Cletrac FD series machines; 24 x 57-in. for Allis-Chalmers HD10 and International TD-18 tractors. Interchangeable on same frame with Buckeye Unitilt bulldozer and trailbuilder blades.—**The Buckeye Ditcher Co., Findlay, Ohio.**

★ ★ ★

BLACKOUT PAINT, introduced as SP3000 "Eclipse," is said to be completely opaque and to possess unusual weather-resisting qualities, together with added advantage of overnight drying. Comes ready for use and may be applied either by brush or spray —**Thompson & Co., P. O. Box 6757, Pittsburgh, Pa.**

★ ★ ★

3½S NON-TILTING MIXER, end-discharge model mounted on two pneumatic-tired wheels, has following features: (1) 6-in. lower shoveling height which is said to cut as much as 5 mi. of shoveling in 5

days of work; (2) self-cleaning hopper with no hopper gate to jam with aggregate or cement; (3) shimmy hopper control said to make stickiest material flow freely into drum; (4) die-formed pressed steel drum heads and drum tracks. Equipped with 3½-hp. air-cooled motor with water tank optional. —**Chain Belt Co., 1600 W. Bruce St., Milwaukee, Wis.**

*It takes the SHOCK OUT OF ROCK

*New Hydraulic Clutch—

(1) Greatly improves "hanging-on" performance
(2) Cushions and protects against severe impacts

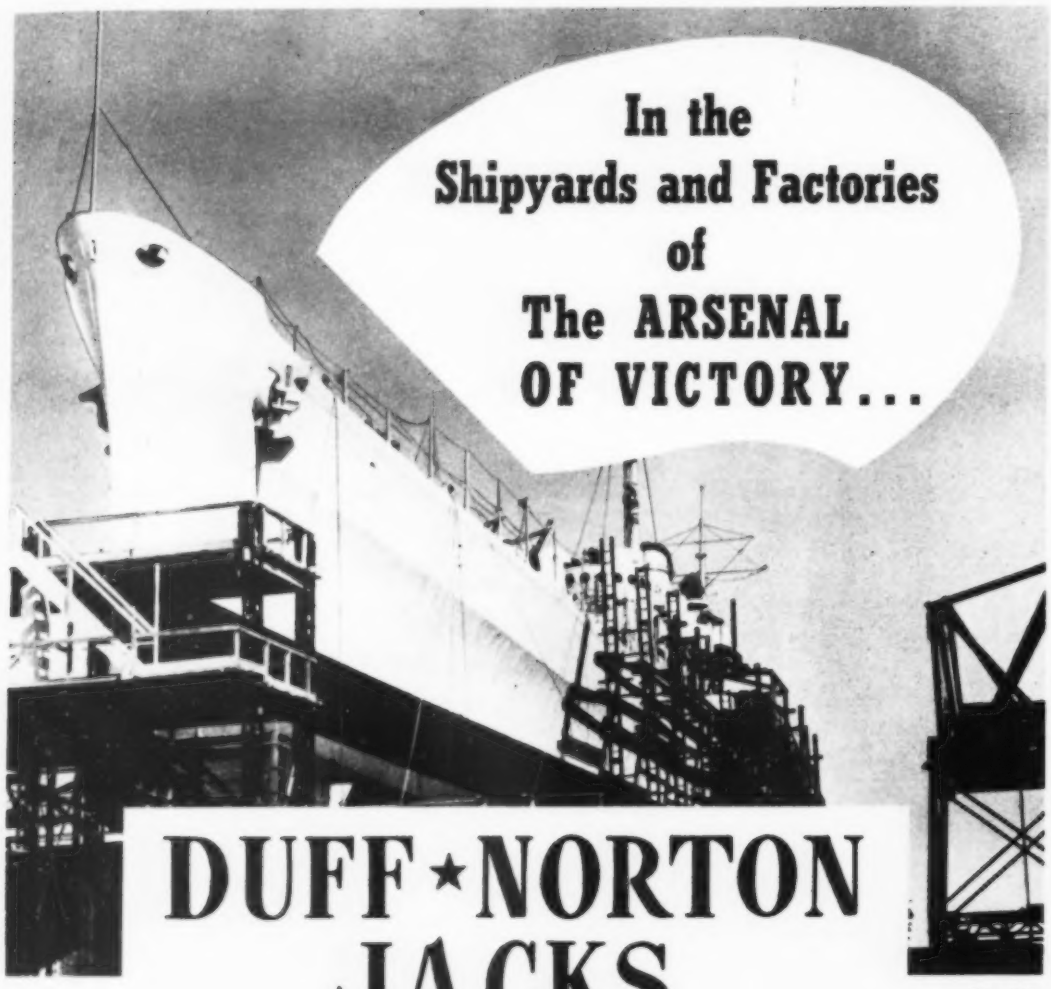
The 2-yd. Lorain-82, equipped with hydraulic (fluid) clutch, is the closest approach to a steam machine in smoothness and "never-say-die" power control of any clutch type unit to date. You can't stall the engine under any digging circumstances. The severe shocks and impacts inevitable with rock digging are cushioned and absorbed, eliminating costly stresses and strains on the mechanism and cables. The hydraulic coupling may be "de-clutched" and its drag positively eliminated to stop the machinery for lubrication or adjustment.

You can wade into rock confidently with a Lorain-82 with the assurance that its power and digging force will "hang on" relentlessly until the most unyielding rock is in the dipper—and at the same time the hydraulic clutch will provide an automatic check against destructive impacts and shocks. Write today for complete details on the Lorain-82 and this newest machine-and-money-saving feature.

THE THEW SHOVEL COMPANY
LORAIN, OHIO

THEW CENTER DRIVE

2-YD.
LORAIN-82
WITH HYDRAULIC CLUTCH



Official U.S. Navy Photo

DUFF★NORTON JACKS

serve faithfully and well!

● Wherever you find men at work—helping produce the ships, guns, tanks and tools that will win the war—you'll find Duff-Norton Jacks providing "mechanical muscles" to speed the fight for victory.

No matter how tough the job—no matter how gruelling the service, Duff-Norton Jacks are doing faithfully and well every kind of lifting, lowering, pushing, pulling.

Over 300 types of sizes of these husky Jacks stand ready to help you meet production schedules. Every Duff-Norton Jack will give you safe, dependable, efficient service.

Ball Bearing Screw Jacks for Extra Heavy Duty.

Low Height Journal Jacks.

Bell Bottom Jack Screws.

Send for 64 page catalog

Catalog 200 will provide you with 64 pages of valuable Jack data—complete specifications on the entire Duff-Norton line. Write for your copy today!

"The House that Jacks Built"

THE DUFF-NORTON MANUFACTURING CO.

PITTSBURGH, PENNSYLVANIA

Canadian Plant: COATICOOK QUEBEC

Representatives in Principal Cities

NEWS FROM MANUFACTURERS *About Their Products*

The publications reviewed below, will keep you posted on latest developments in construction equipment and materials available for your use.

DETACHABLE BITS FOR ROCK DRILLING—**Ingersoll-Rand Co.,** Phillipsburg, N. J. (24 pp., illustrated.) Money-saving advantages of Jackbits for rock drilling involving reductions of from 10 to 40 percent in drilling costs, are cited for numerous jobs and mechanical features of detachable bits of several types and sizes are described and illustrated in this booklet (Form No. 2780). Reverse-buttress, long-life thread enables detachable bit to be screwed on or off rod easily. Savings in costs of transporting drill steel to and from point of use are made possible by detachable bits. Also, they lend themselves readily to resharpening by grinding and lessen chance for "stuck" steel. Special designs of Jackbits are available to meet various rock conditions.

★ ★ ★

CONCRETE BRIDGES — **Portland Cement Association,** 33 West Grand Ave., Chicago, Ill. Continuous Hollow Girder Concrete Bridges (40 pp., illustrated) and Continuous Concrete Bridges, Second Edition (108 pp., illustrated) present information, formulas, charts, graphs and drawings on the design of hollow girder, solid girder and solid slab concrete bridges. Design procedures are illustrated by problems with their solutions.

★ ★ ★

MORE MILEAGE FROM TIRES—**Firestone Tire & Rubber Co.,** Akron, Ohio (52 pp., illustrated.) Pocket-size booklet entitled, "How to Get More Mileage From Your Tires," explains proper care of pneumatic tires to assure maximum service. Illustrations show causes of excessive wear and methods of conserving rubber by proper inflation, correct load distribution and timely retreading. Booklet contains inflation table for tires from 6.00x17 to 14x24.00-in. sizes.

★ ★ ★

ARC WELDING — **Lincoln Electric Co.,** Cleveland, Ohio. (19 pp., illustrated.) Describes new shield-arc welder with self-indicating selectors for dual continuous control, safety-zoned control cabinet and motor protection. Current control feature enables welder to select any desired number of amperes to suit size of electrode and type of joint material. Improved mechanical features illustrated and explained. Machines in sizes up to 600 amp. Also list of electrodes for a variety of specific uses.

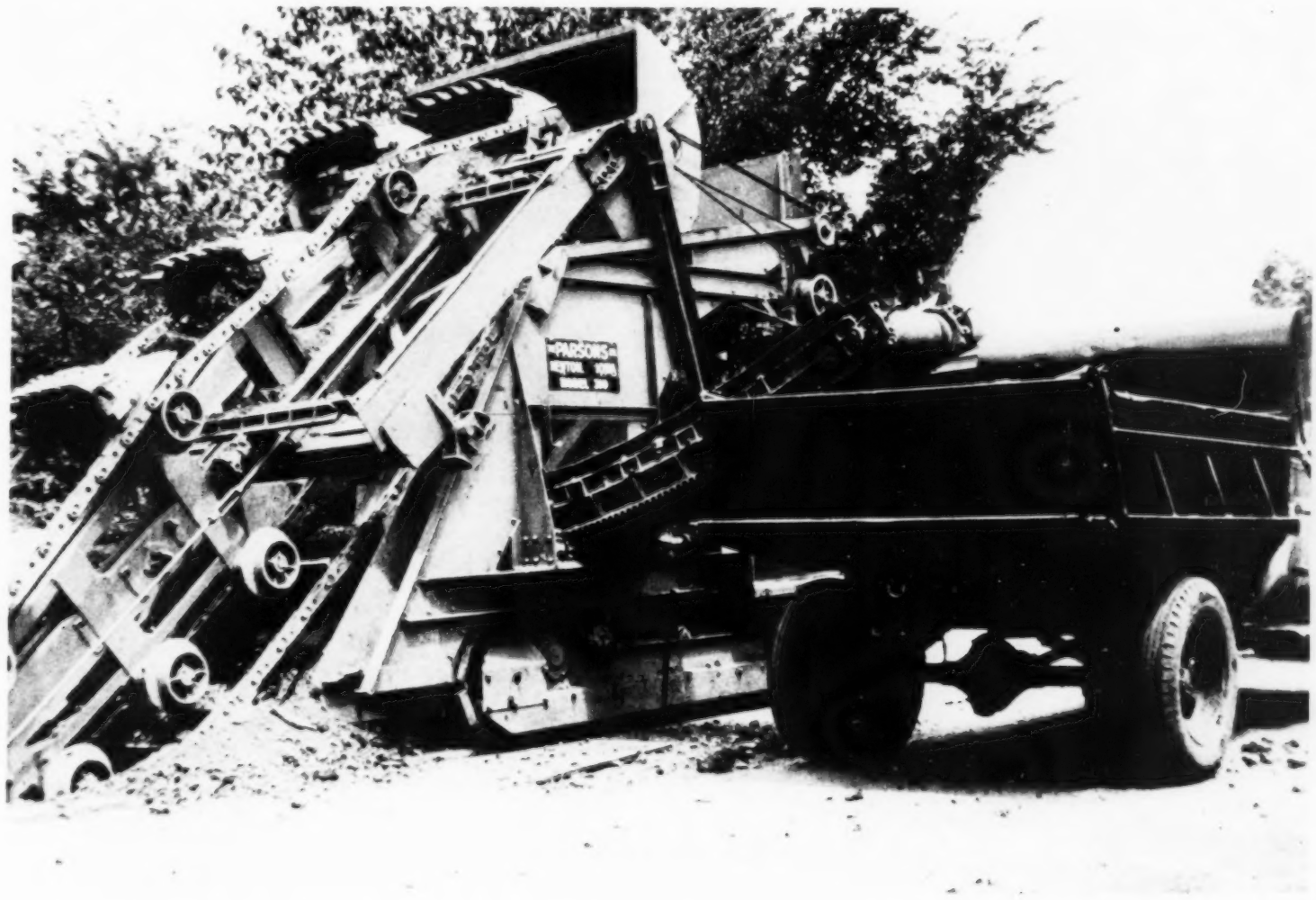
★ ★ ★

PORTABLE TAR KETTLE—**Diamond Iron Works, Inc.,** Minneapolis, Minn. (4-p. folder, illustrated). Presents graphic description of features of tar and asphalt melting kettles, available in capacities of 75, 110, 165, 210 and 315 gal., as follows: (1) Mahr burner gives quick intense heat; (2) heat envelops entire kettle; (3) free flow of hot material; (4) welded, all-steel construction. List of specifications and dimensions.

★ ★ ★

STATIONARY AIR COMPRESSORS—**Schramm, Inc.,** West Chester, Pa. (12 pp., illustrated) Standard types of stationary compressors with brief descriptive data and specifications for sizes with actual air deliveries at 100 lb. per sq.in. of from 85 to 420 cu.ft. Types of drive include belt drive, built-in electric motor and gasoline or diesel engine in line. Tables give data on capacities, horsepower required, dimensions and weights.

PARSONS TRENCHERS



SPEED UP VICTORY PROJECTS!

PARSONS TRENCHERS are built with fully enclosed cut and hardened gearing, alloy steels, anti-friction bearings, the offset boom, and plenty of power. These plus features insure fast, continuous operations on good, bad or indifferent ditch specifications.

ALL OVER THE NATION Parsons Trenchers are working night and day to speed up VICTORY projects, in all types of soil — loam or gumbo, clay or shale, wet or dry.

FOR SPEED, clean and deep digging and low maintenance cost PARSONS TRENCHERS have been the accepted standard for over 35 years.

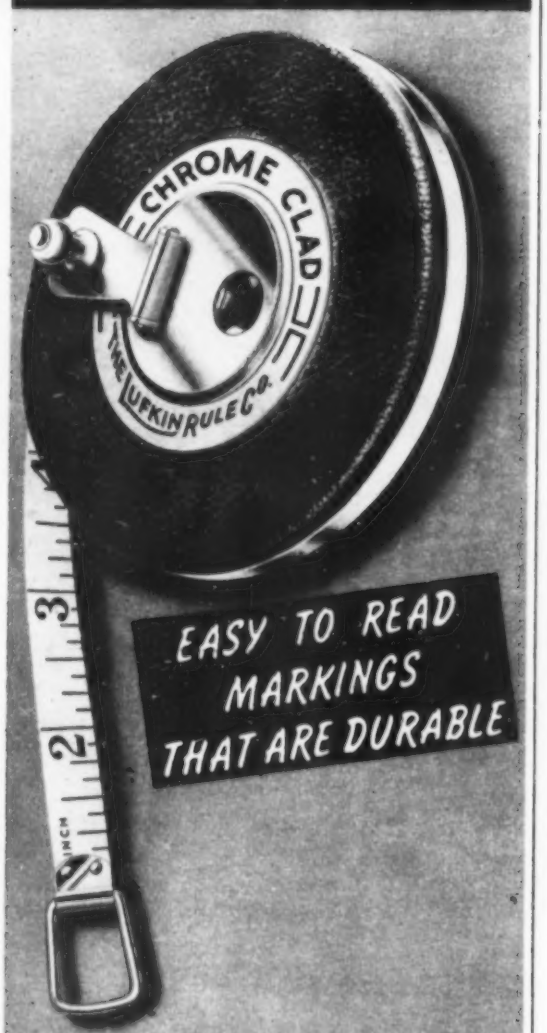
MORE DITCH PER MINUTE IS ASSURED — BUY PARSONS

PARSONS

WE'LL MOVE THE EARTH TO SERVE YOU

THE PARSONS COMPANY, NEWTON, IOWA

"LEADER"—
CHROME CLAD STEEL TAPES FOR *busy* CONTRACTORS



Tired of trying to use a hard-to-read, old fashioned steel tape? Then now's the time to get a new Lufkin "Leader"—the tape with the Chrome Clad line that contractors everywhere are praising. Jet black markings show up prominently against a satin-chrome surface that won't rust, crack, chip or peel. The "Leader" will be your most useful tool. Order it from your dealer today. Write for free Catalog.

LUFKIN

SAGINAW, MICHIGAN • New York City

TAPES . RULES . PRECISION TOOLS

ROAD MAINTENANCE EQUIPMENT — **Littleford Bros.**, East Pearl St., Cincinnati, Ohio. (Folder, illustrated.) Brief, illustrated descriptions of road brooms, supply tanks and pressure distributors for handling asphalt and tar, heaters for asphalt tank cars, road rollers, emulsion sprayers, tool heaters, asphalt kettles and paving tools.

★ ★ ★

SNOW REMOVAL—**La Plant-Choate Manufacturing Co., Inc.**, Cedar Rapids, Iowa. (8 pp., two-color booklet). Describes in detail various models of snow plows manufactured for use with Caterpillar diesel tractors and adequately illustrates applications of equipment in field.

★ ★ ★

SKIDPROOFING ICY ROADS AND STREETS—**Calcium Chloride Association**, 4145 Penobscot Bldg., Detroit, Mich. (36-p., illustrated handbook). Latest manual prepared by this company is based on practical experience of nearly all ice-fighting states and covers all phases of ice control practice—from skidproofing program to actual use of methods, materials and equipment.

★ ★ ★

SHOVEL-CRANE-DRAGLINE — **Link-Belt Speeder Corp.**, Chicago, Ill. (16 pp., illustrated) Catalog No. 1885 describing 2- to 3-yd. Speed-o-Matic Series 500 shovels, cranes, draglines includes seven pages of dimensions, clearance diagrams, working ranges, lifting capacities and brief specifications.

★ ★ ★

LOW-COST OVERPASS—**R. G. LeTourneau, Inc.**, Peoria, Ill. (4-p. booklet illustrated). Describes and illustrates Tournapass, portable all-steel welded overpass designed to insure constant traffic flow at busy intersections. Photographs, actual time studies and car counts taken at recent demonstration and trial period are featured. Also transportation, assembly and construction are explained.

★ ★ ★

CONVEYOR BELT—**B. F. Goodrich Co.**, Akron, Ohio. (4 pp. illustrated) Principles underlying construction of cord conveyor belt and results obtained through its use are presented in this folder. Belt is used where working conditions are severe.

★ ★ ★

Well Points, Pile Jets and Crib Cofferdams Serve Builders of *Bridge Piers*

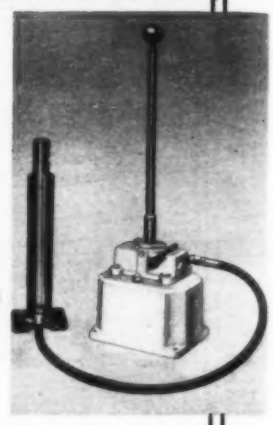
(Continued from page 48)

bases supported by timber piles. Smaller piers in the approaches, rising to heights of 40 ft. or less above their bases and supporting continuous girder units made up of spans less than 124 ft. in length, are two-column bents with separate foundations under the two legs of each unit. Piers which rise to greater heights

(Continued on page 94)

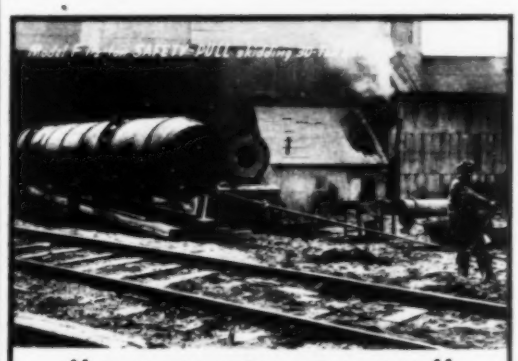
HYDRAULIC EQUIPMENT BY
COMMERCIAL
★

PORTABLE LIFTING POWER WHERE AND WHEN YOU WANT IT!



Here's hand actuated lifting power that's "on the job" wherever and whenever you want it. COMMERCIAL light weight, self-contained double acting pumps, have rams available with lifting capacities up to 4,000 lbs. Completely portable (you can put them anywhere), these units can be of great value to any contractor. They work in any position, and the few moving parts mean little or no maintenance. Numerous lifting or jacking operations can be handled economically, speedily and efficiently with COMMERCIAL Hydraulic Equipment. Details on sizes, types, prices, etc., may be had upon request. Write today!

THE COMMERCIAL SHEARING & STAMPING COMPANY
YOUNGSTOWN, OHIO



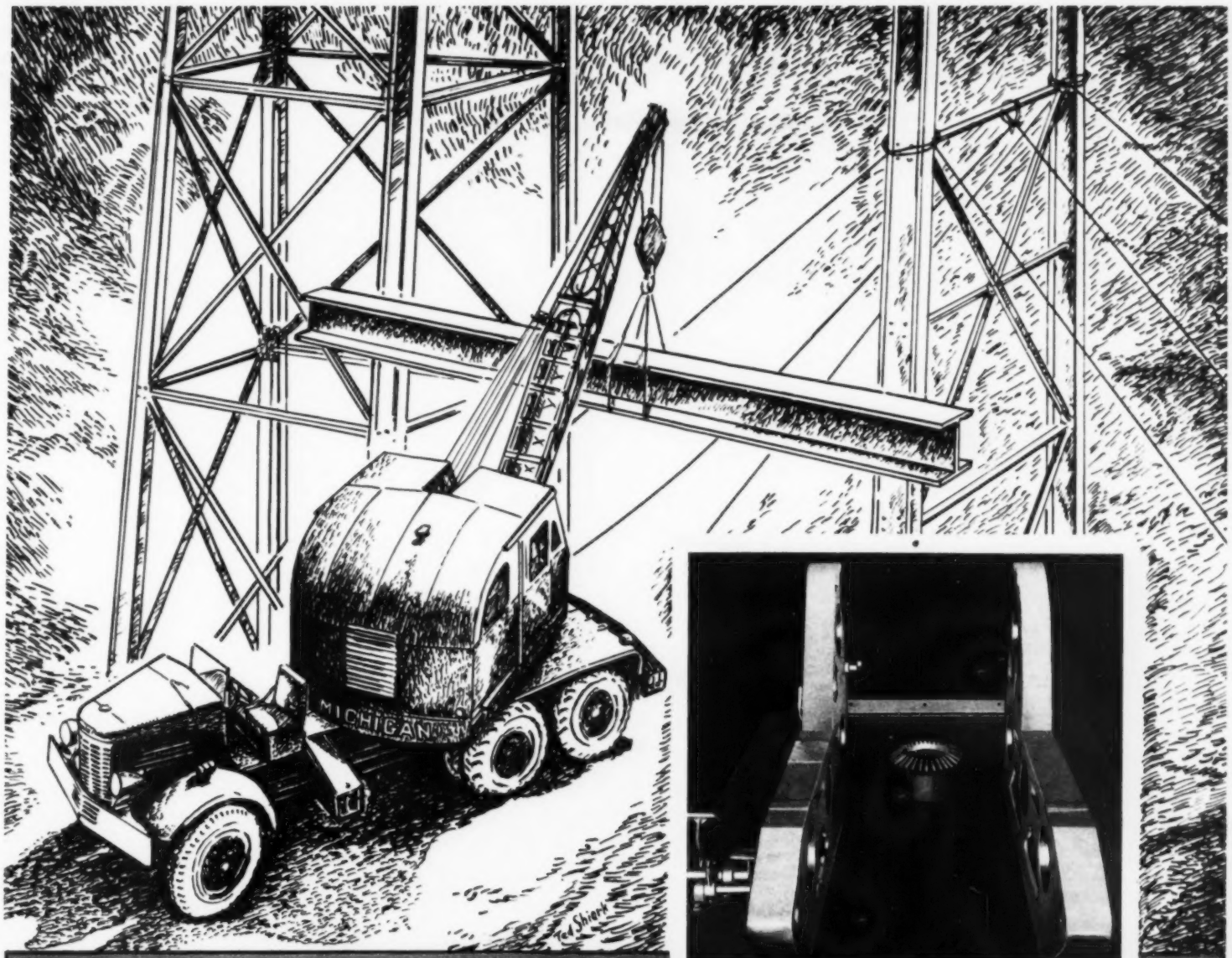
"SAFETY-PULL"
It's Giving Thousands of SAFE
PULLS and LIFTS
to help speed up your
"American Victory Program"

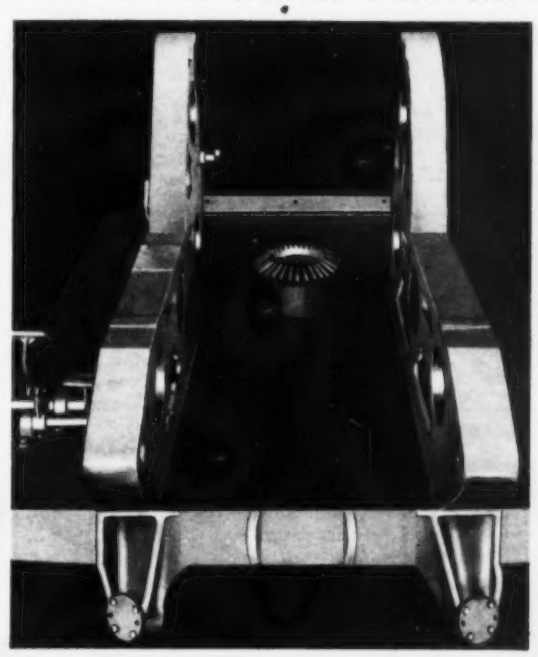
COFFING'S

New Improved Model G Series "Safety-Pull" Ratchet Lever Hoists are built in convertible capacities ranging from ¾ to 15 tons, yet they weigh only 14 to 150 pounds. Greatly increased production facilities make it possible to give immediate service. For further information consult your supply house or write for our Catalog No. DG-5.

COFFING HOIST COMPANY
886 Walter Street Danville, Illinois

RATCHET LEVER HOISTS SPUR GEARED HOISTS
ELECTRIC HOISTS
LOAD BINDERS TROLLEYS DIFFERENTIALS





Note rugged clean-cut design of MICHIGAN'S machinery frame—how it eliminates unnecessary weight and bulk. A special machine bores bearing retainer holes in straight line through both side frames at once.

How MICHIGAN Mobile CRANES help you meet tough schedules!

War-time construction shedules demand that every available machine produce to capacity! Excessive "down-time" for *any* machine cannot be tolerated!

MICHIGAN Mobile CRANES are built for "tough going" and overtime a-plenty to meet your war-time schedules successfully. For instance, look at MICHIGAN'S turntable mount: It's cast in one piece from electric steel. That's why shafts and bearings stay in perfect alignment, minimizing wear and insuring smooth operation throughout a long life. Thus, precious time and man-power is saved for actual production on-the-job.

MICHIGAN Mobile CRANE owners are enthusiastic about MICHIGAN'S ability to work long, hard hours, without costly "down-time" for repairs. Why not talk to one of these owners, or write for Bulletin CM52?

MICHIGAN
AIR-CONTROLLED
SHOVELS - CRANES - CLAMS DRAGLINES - TRENCH HOES

HAISS Hi-power

FOR PAY-LOAD CLAMSHELL DIGGING

ALL SIZES AVAILABLE

Your good crane deserves one! Real he-man digging power and a hefty sturdiness that will stand up to your toughest goings . . . a Haiss Hi-Power will make money for the man who owns it. Catalog on request.

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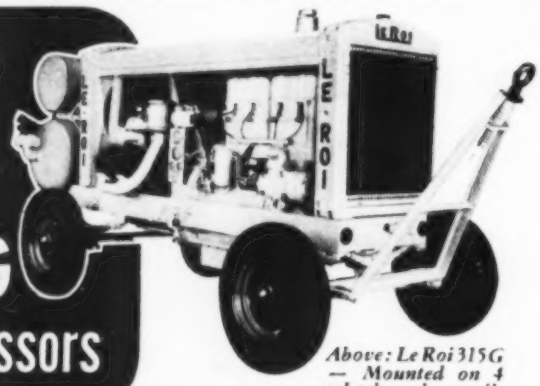
DISTRIBUTORS EVERYWHERE

Le Roi-engineered for speed-economy—

LE ROI 315 G Portable Air Compressors



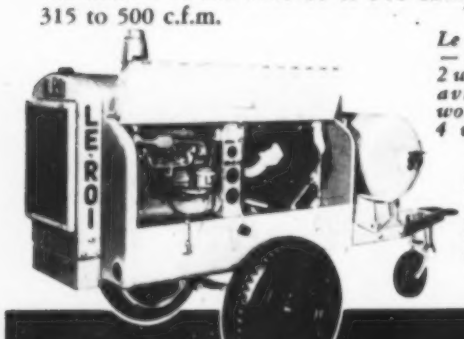
Above: Le Roi 315G — Mounted on 4 wheels—also available on wood skids. 315 c.f.m.

Built by the *only* manufacturer of *both* engine and compressor. Quickly towed *to* the job; easily moved about *on* the job. Valve-in-head engine easily accessible, to reduce "down time." • Big capacity for long-time, low-cost, continuous heavy-duty service. Write for descriptive Bulletin 62G-1 and ask for Form S-183 showing how many tools you can operate from this 315 c.f.m. machine. • Other sizes 60 to 500 c.f.m. Diesel models 315 to 500 c.f.m.

Some points to remember in ordering air compressors:

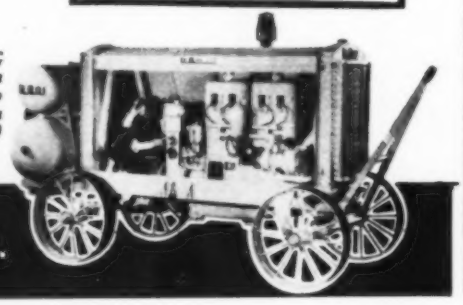
To do your part for Uncle Sam, specify steel wheels or wood skids instead of pneumatic tires, where practical—thus help save rubber.

Please be patient with delivery delays made necessary by the urgency of war orders.



Le Roi 105GV — Mounted on 2 wheels — also available on wood skids or 4 wheels. 105 c.f.m.

Le Roi 210G — Mounted on 4 wheels — also available on wood skids. 210 c.f.m.



LE ROI COMPANY • MILWAUKEE, WIS.

(Continued from page 92)

or carry longer spans have continuous, one-piece bases under the shafts. Maximum height of pier shafts above the bases exceeds 71 ft.

Eight piers in the river, including the two main piers under the 845-ft. channel span and the supporting pier under the outer end of the east side span, were constructed in cofferdams which were sealed with tremie concrete and unwatered prior to pile cutoff. Bases of all shore piers were constructed in the dry.

Construction Layout — Seventeen piers on the west side of the river, including the supporting pier at the west end of the second side span, are shore piers which could be constructed with land equipment. An equal number of approach piers on the other side of the river similarly could be built with land plant.

For each of the land sections, the contractors supplied an independent construction plant consisting of a crane-operated piledriving and jetting outfit, separate cranes for excavating and for handling concrete and forms, a mobile paving mixer and a batching plant to serve the paver. In constructing the river piers, derrick boats drove and jetted piles, and a floating mixing plant placed the concrete.

Land Piers

Creosoted timber piles are used for all pier foundations where the piles are cut off above water level, and untreated timber piles are installed at locations where the piles will be constantly under water. On the west side of the river, sixteen piers rest on creosoted piles, and only Pier 17 is founded on untreated piles. The eight piers in the river are supported by untreated piles. Of seventeen shore piers on the east side, nine located in low-lying land adjacent to the river have foundations of untreated piles, and the remaining eight piers rest on creosoted piles. Both abutments are supported on treated piles.

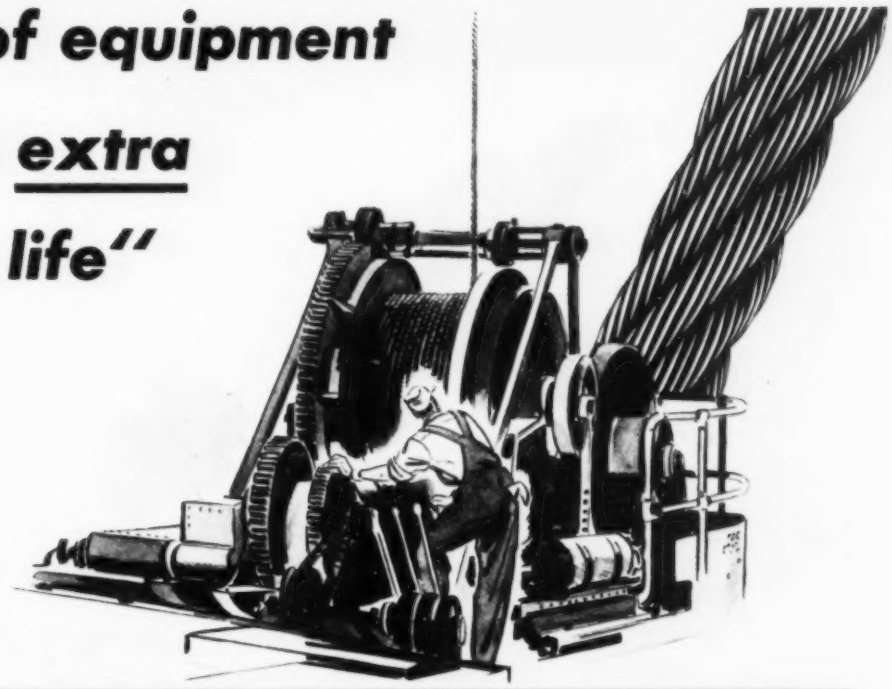
Specifications required that foundations for all shore piers be constructed in open excavation, completely unwatered, and that all concrete for the footings of these piers be placed in the dry. The bases, or footings, of the shore piers in general are at shallow depths of 7 to 10 ft. below the surface of the ground, with a few deeper. Conventional methods of excavating and draining foundations were employed by the contractors for all shore piers except the seven in low land nearest the river on the east side.

Predrained Trench

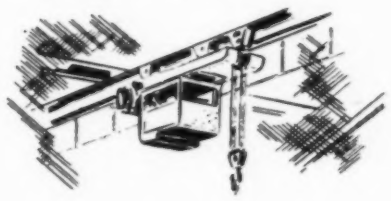
Two considerations prompted the contractors' decision to dig an open trench and predrain the excavation for these piers, in which footing concrete had to be placed at depths up to 10 ft. below normal water level and 16 ft. below high water level. One important consideration was the elimination of expensive cofferdamming for the piers, and a second equally

(Continued on page 96)

"This 'once-over' of equipment pays off in extra wire rope life"



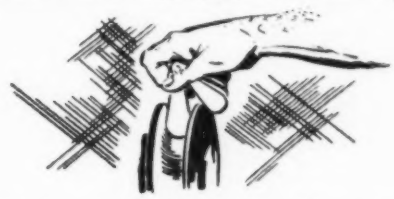
"If you're out to get a full measure of service from your wire ropes, it's just good, common sense to check the equipment it runs on. Not just when you get around to it, but regularly —carefully and often. Make a close check-up when a new rope is installed ...and then check again, frequently— *before* the rope starts to show signs of wear. Take a crane, for example, with a worn sheave.



It will go right along handling every bit of work it always did. But that sheave will out and squeeze the wires ...and the rope will be through, long before its time.

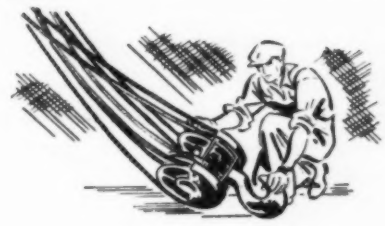
Here are some of the things to look for—some of the reasons why you often hear an operator blame the rope when it was really his own equipment that shortened its life.

First, see if any sheaves are out of alignment. Then check for deeply worn grooves with a gauge,—like this...

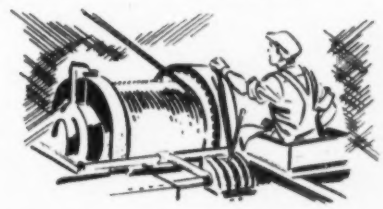


The grooves may be scored by an old rope or one of them may have a broken rim that calls for replacement. Sheaves may turn hard or wabble because of worn or damaged journals. That's tough on your ropes, too.

It's easy to realize the jerk or shock at the fastening when a wire rope whips. Vibration has the same kind of effect, building up a great many small shocks. Too much play in the rope may be to blame...even a bent shaft.



Check for displaced or faulty rope guards. Then find out from the operators if there are any clutches that stick or grab...loose bearings or anything else that causes the pull on a rope to be uneven or jerky.



And remember to consult your wire rope manufacturer on any special problems. There are local representatives near you who have practical experience in ferreting out any "bugs" in your equipment that may be keeping your wire ropes from delivering a maximum of service."

JOHN A. ROEBLING'S SONS COMPANY
TRENTON, NEW JERSEY
Branches and Warehouses in Principal Cities

ROEBLING
"Blue Center"
STEEL WIRE ROPE
PREFORMED OR NON-PREFORMED

"THE BATTLE HAS BEEN JOINED"

● The "Battle of Production"—of supplies and more supplies for our armed forces — is the decisive battle being fought today. On its result hinges the history of the next thousand years.

As to how this battle fares, we—the men at Williams—are proud to report: since Pearl Harbor, each one of us has done his utmost not to lose a single hour on any shift. We've worked around the clock, and with allowances for maintenance, around the week. Yes, "the battle has been joined"—and Williams' men are in there *fighting*.

LET'S GO! U.S.A. · KEEP 'EM FLYING!

J. H. Williams & Co., 225 Lafayette St., New York

WILLIAMS

Headquarters for over half a century for DROP-FORGINGS and DROP-FORGED TOOLS

LET'S GO! U.S.A. · KEEP 'EM FLYING!

(Continued from page 94)

weighty factor was the necessity of providing material for an embankment which would carry a construction road at an elevation above flood stage. With dragline excavators, the contractors cut a trench along the line of the bridge through the locations of the seven piers and of several other piers beyond them in the direction of the east abutment. Spoil from the trench formed the embankment for a construction road paralleling the bridge. Four Moretrench pumps and 150 well points lowered the water level in the trench and dried up the excavation at the seven piers for foundation construction.

River Piers

Six river piers east of the two main piers were constructed in steel sheetpile cofferdams employing sheeting 60 ft. to 30 ft. long, and seal concrete was placed around driven piles in the cofferdams at depths 32 to 17 ft. below pool stage. Thickness of the seals ranged from 10 ft. to 5½ ft. During construction of the piers, several fall and winter floods raised the river stage to 6 ft. above pool.

For the two main piers, the contractors utilized timber crib cofferdams adopted with only slight modifications from the plans offered by the project engineers. At Pier 18, the deepest pier, the cofferdam was sunk to 61 ft. below pool stage, and seal concrete surrounding an interior sand-filled pocket was deposited by tremie to a depth 4 ft. above the bottom of the crib. At Pier 19, the timber crib was sunk to a depth of 41 ft. below pool, and a solid mat of tremie concrete was placed around the piles to within 4 ft. of the bottom of the crib.

Inside plan dimensions of the two cofferdams are 75½x49 ft. at Pier 19 and 75½x 43 ft. at Pier 18. In the deeper cofferdam at Pier 18, tremie concrete was placed in walls 8 ft. thick around the interior sand-filled pocket and to a depth of 7 ft. over the top of the 25-ft. sand fill, making a total height of seal of 32 ft., with the top of the seal 25 ft. below pool stage. For shallower Pier 19, plans called for a continuous mass of seal concrete 7 ft. thick, with the top of seal 30 ft. below pool.

After the cofferdams had been unwatered and piles had been cut off, base concrete to the full inside dimensions of the cribs was placed on top of the seals to an elevation 12 ft. below pool stage in the deeper pier and to 8 ft. below pool stage in the other pier. At each pier, the portion of the timber cofferdam above the top of the base was removed after the pier shafts had been constructed.

Timber Cribs

To meet a specified requirement that outer walls of cribs remaining in place should be not less than 10 in. thick, the contractors constructed these walls with 10x12-in. timbers drift-pinned to one another and bolted to steel corner angles and to intermediate vertical wales consisting of 53-lb. steel H-beams, as indicated by an accompanying photograph of Pier 18,

(Continued on page 98)

The Standard Paper for Concrete Curing

SISALKRAFT is speeding the completion of strategic highways for the movement of troops and supplies — helping build access roads to camps, plants and airports, and assuring strong, well-cured concrete floors in gigantic new arms plants.

This concrete curing method is simple, fast, effective. Satisfactory curing can be obtained in from 72 to 96 hours. It makes curing *automatic* . . . produces hard, dense concrete without preliminary burlap — no sprinkling, sand, straw or further attention once the blankets are laid in place.

Used throughout the country — in specifications of 36 State Highway Departments. SISALKRAFT rolls, covers and blankets are available from convenient distributor stocks — in sizes to suit every job.

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STSALKRAFT

The Standard Paper for CONCRETE CURING

Saves TIME

Once the blankets are put over the finished slab, no further attention is necessary. No sprinkling, no close inspection necessary, no blading or cleaning after the job is done.

Saves MAN-POWER

Note in the photo above that only two men are required to handle the blankets—do the complete curing job. Curing is automatic.

Saves MONEY

The blankets are rolled up after curing is finished and can be reused many times, reducing the unit cost of curing. Same blankets can be used on the job for numerous protective uses — over sub-grade, covering material and equipment.

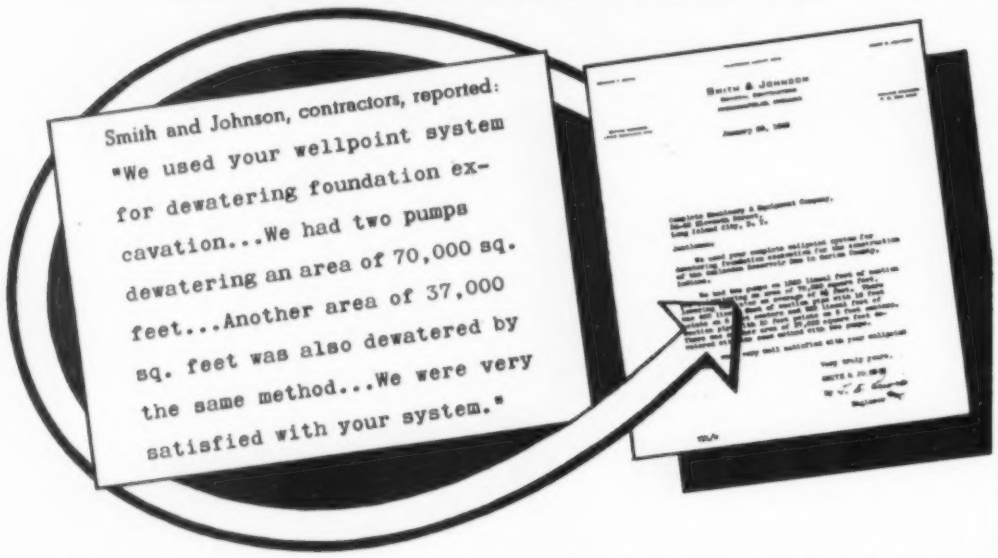
WRITE

for data, samples and details of SISALKRAFT on-the-job service.

COMPLETE WELLPOINT SYSTEMS

On the job...in Indiana!

Installation of Complete Wellpoints at Oaklandon Reservoir Dam, Northeast of Indianapolis


Smith and Johnson, contractors, reported:
"We used your wellpoint system
for dewatering foundation ex-
cavation...We had two pumps
dewatering an area of 70,000 sq.
feet...Another area of 37,000
sq. feet was also dewatered by
the same method...We were very
satisfied with your system."

At no time is it practical to allow wet ground to slow up your project. Today, when speed is the No. 1 requirement, it is imperative that no time be lost because of wet excavating conditions.

The above evidence, in which only two pumps were necessary to dewater an area of 70,000 square feet, proves how inexpensive Complete Wellpoints really are!

Find out how little it costs to put Complete Wellpoints to work for you. We can show you how to dry up wet jobs speedily—and at a saving.

Write today for complete details.

Complete Machinery & Equipment Co., Inc., 37-14 10th St., Long Island City, N.Y.

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MAIN OFFICE & PLANT
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BRANCH WAREHOUSE
• • GARY, INDIANA • •

(Continued from page 96)

located inside the pierhead line on the Iowa side. Vertical steel piles were driven alongside the crib to guide it in sinking. A steel cutting edge, prefabricated on shore, formed the bottom member of each crib wall, and cross bracing inside the crib was installed in horizontal planes as required to maintain a rigid structure.

Cribs were constructed and sunk from temporary timber pile staging, as shown in the photograph. Supporting cables from hand winches on the temporary staging maintained the crib at a uniform level while being sunk. As sinking progressed, temporary loads were placed on the crib to overcome buoyancy and aid penetration into the riverbed. Each crib penetrated about 25 ft. into the sand and gravel bottom of the river. To assist in sinking the crib through this material, the outer walls were equipped with vertical pipes delivering air and water at high pressure to jets at the cutting edge. Pumps and compressors on the pile-supported platform served these jets. Excavation with clamshells inside the crib further aided the sinking operations.

After a crib had been sunk to final position, sand and gravel inside was excavated about 2 ft. below bottom of concrete to compensate for material that would flow in during the driving of piles. To sink the 95-ft. timber piles, 336 at Pier 18 and 384 at Pier 19, the contractor employed two combination air-and-water jets with a single-acting 6½-ton steam hammer traveling in rigid leads.

Jetting Piles

Piles 90 and 95 ft. long for the four principal piers of the bridge are driven to a designed loading of 45 tons as determined by the *Engineering News* formula. Shorter piles, 30 to 75 ft. long, under the approach piers, have a designed loading of 35 tons each. Total length of the 1,758 untreated piles and 756 creosoted piles for the job is 182,000 lin.ft.

Two jetting outfits were employed in sinking long piles, as shown by accompanying photographs of the work at Pier 20, where a Vulcan 6½-ton steam hammer drove 90-ft. piles to a depth of about 75 ft. below the bottom of concrete. Each combination jet consisted of a 3-in. water pipe with a 1½-in. nozzle and a 1¼-in. air pipe with a ¾-in. nozzle. The jet pipes were 85 ft. long. Water was supplied to the two jets at 90-120-lb. pressure by a Jaeger jet pump and by a CH&E unit equipped with a Goulds four-stage centrifugal pump. A Chicago Pneumatic diesel-powered 320-cfm. compressor and a LeRoi-Rix 260-cfm. compressor furnished air at 110-lb. pressure for the two jetting outfits. The pile hammer operated in rigid leads supported on piles. This equipment installed an average of about five 90- or 95-ft. piles per 8-hr. shift.

In putting down shorter piles for land piers, the contractors used single jetting outfits in conjunction with Vulcan single-acting 3,000-lb. steam hammers mounted in adjustable leads supported from the booms of crawler cranes. Adjustable leads

(Continued on page 100)

This wrench has been idle for 11,000 hours

Gus Zimmerman's wrench has not always led such an easy life. As chief engineer for the Galland Laundry in San Francisco, Mr. Zimmerman's job is to take care of all the intricate machinery in a plant that uses 118,252,000 gallons of water and 1,665,000 gallons of soap per year. A very important part of that machinery is a big Diesel-generator set that handles the juice for the night shift.

For some reason that nobody could figure out, that engine kept Mr. Zimmerman's wrench busy. For the first two years of its life it only averaged 2700 hours between overhauls. Rings stuck, cylinder wear was high, gum and carbon stuck the valves, and the din it made carried across the street.

At this point it is probably better to let Mr. Z. do the talking:

"Yes, we tried out RPM DELO, and frankly I wasn't sure it would make a great deal of difference. But it did. We haven't had a stuck ring or stuck valve — and the engine is so quiet now you can carry on a normal conversation right beside it. But what counts most is it has run 11,000 hours without my putting a wrench to it and it is still going strong."

RPM DELO

DIESEL ENGINE LUBRICATING OIL

ORDER RPM DELO FOR YOUR DIESELS

RPM DELO is marketed under the following names:

RPM DELO

Calso Diesel Engine Lubricating Oil · Sohio RPM DELO · Caltex RPM DELO
Kyso RPM DELO · Signal RPM DELO · Imperial-RPM DELO (concentrate)

Ask your Diesel engine manufacturer or distributor for the RPM DELO supplier in your vicinity.

STANDARD OIL COMPANY OF CALIFORNIA

TAPER ROLLED BLADE

Strongest construction open back type. Heavy section extends full width of blade from top to point of frog where strain is most severe. Blade and socket heat treated.

RIVETLESS SOCKET

No rivets. Socket is smooth and elimination of rivet holes increases strength of handle.

HANDLES

Northern ash. Attractively finished with a walnut color. Bug-proof lacquer.

•

• Perfect balance. Supplied in D and long handle. Round and square point.

(Continued from page 98)

were necessary in driving piles in the east and west rows of certain pier foundations where these piles were battered 2 in. per foot. A typical outfit is shown in photographs of operations at Pier 15, on the west side of the river, where a P&H crane handled the hammer and jet. Water supplied at 90-lb. pressure by a Chicago centrifugal pump was delivered to a 2¾-in. jet pipe reduced to 1½ in. at the nozzle. Air at 100-lb. pressure from a LeRoi 210-cfm. compressor passed through a 1¼-in. pipe with a ¾-in. jet nozzle. The two pipes were combined in a single jetting unit. Sinking 65-ft. piles through about 10 ft. of soft silt and 50 ft. of sand, silt and gravel substrata, this pile jetting and driving outfit put down about eight to twelve piles in 8 hr. On the east side of the river, similar equipment operated in conjunction with a Link-Belt crane.

Concrete Construction

All concrete for the piers was designed for a minimum compressive strength of 3,000 lb. per sq.in. at 28 days. The mix employed coarse aggregate of No. 4 to 1-in. gradation and incorporated at least 6½ sacks of cement per cu. yd. Specifications provided that the slump in general should not exceed 3 in. All concrete except that placed in sealing courses of piers was consolidated with power-driven vibrators. The contractors used plywood form lining for all exposed concrete surfaces.

Total concrete for the job amounted to nearly 23,500 cu.yd. Of this quantity, 8,125 cu.yd. went into the bases of the two main piers and nearly 2,875 cu.yd. into the bases of the six other river piers. The shafts of the eight piers in the river required more than 5,600 cu.yd. Bases and shafts of the west abutment and seventeen shore piers on the west side took more than 2,800 cu.yd. Similar structures on the east side required in excess of 4,100 cu.yd. Reinforcing steel and miscellaneous metal in the substructure contract totaled more than 617 tons.

Separate batching plants and mobile mixing units served land construction on the two sides of the river. On the west side, as indicated by an accompanying photograph, a Rex 21E paver mixed the concrete, which was deposited in place from Insley buckets by a Lima crane. A Chicago Pneumatic air-driven vibrator and a Mall gasoline-powered vibrator consolidated this concrete in the forms.

For concrete construction in piers on the Illinois side, the contractors utilized a Koehring 27E paver and a Northwest crane with a 75-ft. boom to handle concrete buckets, falsework timbers and form panels. A floating mixer plant produced the concrete for the river piers.

Supervision

Operations at the site are directed for the engineers, Howard Needles, Tammen & Bergendoff, Kansas City, Mo., by Ivan P. Hanson, resident engineer. For the contractors, the Ferd J. Robers Construction Co., Burlington, Wis., and the LaCrosse Dredging Corp., Minneapolis, Frank P. Skibbie is superintendent in charge of the

● Byers full circle shovels and cranes will Hoist, while they Swing, while they Travel, while they Steer. Do you realize what this means on your jobs?

For instance, a dragline digs a section of ditch in a few minutes. Then it moves back to the next cut. If it's a Byers, it moves back *while the operator is swinging* to dump the last bucket load. Time saved, money saved, many times a day!

Or, maybe you've heard an operator cuss when he needed to swing a long boom to one side while steering in the opposite direction.

Why don't you investigate a Byers now?

11 FULLY CONVERTIBLE MODELS IN 3/8-1/2-5/8-3/4 YD. SIZES

Modern CRANES and SHOVELS

BYERS

RAVENNA, OHIO

"FLEX-PLANE"

FINISHING MACHINES

and

JOINT INSTALLING MACHINES

FLEXIBLE ROAD JOINT MACHINE CO.

WARREN, OHIO

job. The associated contracting firms are headed by P. C. Peterson, president, Ferd J. Robers Construction Co., and A. M. Thompson, president, LaCrosse Dredging Corporation.

★ ★ ★

Gridsheet Bank Support For Foundation Cut For New Washington Statler Hotel

(Continued from page 44)

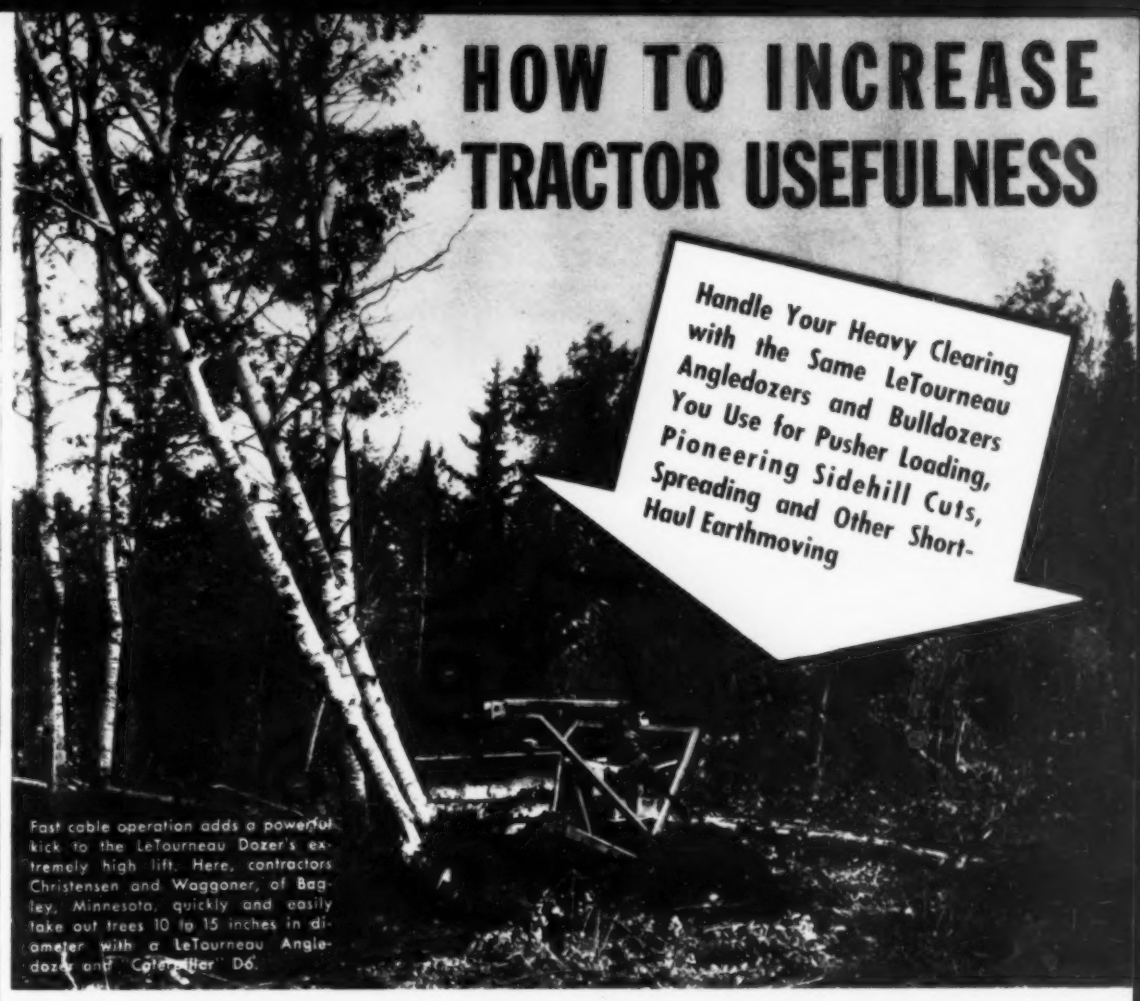
to a depth of 8 ft. a heavy steel ranger beam was set horizontally against the vertical beams to transmit the bank pressures through steel shores into concrete supports below the excavation levels. For these concrete supports the permanent foundation slabs were to be used, so that the shores could not be set until these foundations were in place. Temporarily, therefore, the earth was left sloping up to the banks so that the unsupported vertical beams would not be subjected to heavy stress until the shores were in place.

After the shores had been placed against the upper ranger, the excavation was carried down another 10 ft. and a second ranger was installed. This was supported by a second tier of steel shores similarly supported against permanent foundations. In the boiler room a third ranger and a third tier of shores was required because of the greater excavation depth. Due to the length of the shores, it was necessary to lace them together with steel channels to provide strength against buckling. All connections were made by means of welding, and special brackets and gussets were provided to prevent any slipping. All shores were put into initial stress by means of hydraulic jacks in accordance with the Pretest process, and the compression in the members was continuously checked by extensometers.

During the entire operation periodic observations by surveying instruments disclosed no movements in the system. This was extremely important since the 11-story Investment Building only 18 ft. from the cut was founded in the clay 25 ft. above the excavation levels. The two northerly columns of this building adjoining the boiler room were underpinned by means of Pretest sectional cylinders jacked directly beneath their foundations. These cylinders were forced down into the gravel and subjected to overload tests. The use of the gridsheet system of bank supports

(Continued on page 102)

HOW TO INCREASE TRACTOR USEFULNESS


Handle Your Heavy Clearing with the Same LeTourneau Angledozers and Bulldozers You Use for Pusher Loading, Pioneering Sidehill Cuts, Spreading and Other Short-Haul Earthmoving

Fast cable operation adds a powerful kick to the LeTourneau Dozer's extremely high lift. Here, contractors Christensen and Waggoner, of Bagley, Minnesota, quickly and easily take out trees 10 to 15 inches in diameter with a LeTourneau Angledozer and Caterpillar D6.

Many smart contractors with heavy clearing problems find they save time removing the "big ones" by: (1) saucering out dirt around the fall side of the tree, (2) applying the Dozer blade high up the trunk for extra leverage to rock the tree a few times, then (3) taking it out with a final powerful shove. Fast? You bet! Try this job-proved method on your next tough clearing job. The accompanying diagrams show you how:

"Saucer" around tree, removing dirt, baring roots. *Build dirt ramp for extra leverage high up trunk.* *Hook Dozer under broken roots. Use high lift and forward motion.*

SAVES MANPOWER

The tremendous power of LeTourneau Dozers, combined with their trigger-quick cable action and rugged, all-welded steel construction, enables you to handle your toughest clearing—trees, stumps and heavy boulders—at a fraction of the time and cost of hand labor crews and powder.

AT YOUR SERVICE

Despite sturdy LeTourneau construction and design, breakdowns are bound to occur occasionally in extremely heavy work like this. If they do, you'll find your local LeTourneau-"Caterpillar" dealer ready to help you, with genuine LeTourneau-made parts and factory-trained servicemen, to keep your equipment working with a minimum of delay. Call him TODAY . . . and any day you have equipment maintenance or job planning problems.

HELP YOU WIN WAR — LeTOURNEAU AD POLICY

The General Manager says, "All LeTourneau efforts must be concentrated on winning the war." That means LeTourneau advertising, too. Because construction work is so important and because so many of you will have to make your present equipment last for the duration, we believe our advertising can best help by:

1. Suggesting ways of getting more work from your present equipment.
2. Showing and telling how others are using LeTourneau equipment to increase production.
3. Aiding you with service and repair ideas.

These things we will strive to do in every LeTourneau advertisement.

FREE BULLETIN TELLS HOW TO MAKE YOUR CONSTRUCTION TIRES LAST LONGER

This fact-packed bulletin, "Stretch Your Tires", is specially prepared by LeTourneau for servicemen, mechanics, operators and everyone else who care for construction tires. Contents include:

Recommended tire pressures over a full range of working conditions for LeTourneau Carryall Scrapers (all current and older models), Cranes, Tournapulls, Tournatrailers and Tournacranes • Tire-conserving operating hints • Proper tire upkeep and repair • Haul road maintenance • Recommended tire tools, accesories, etc.

Ask your LeTourneau-"Caterpillar" dealer for a copy of "Stretch Your Tires", or write direct to R. G. LeTourneau, Inc., Peoria, Illinois. It will help you keep your tires rolling longer.

(Below) Scores of successful contractors use Tournapulls for long haul earthmoving . . . thus, release their big tractors for Dozing, pusher loading and short haul Scraper work. Good haul roads like this greatly increase the efficiency of fast-moving, rubber-tired equipment.

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IN ACTION on the biggest construction jobs and contracts of every size throughout the nation, these favorite work hats keep men on the job by keeping heads safe. Skullgard's laminated bakelite construction, one-piece molded, provides durability and resistance to impact proved by years of hard service—*comfort* proved by the greatest popularity enjoyed by any protective hat. 8 different models to choose from!

Type K—standard of the industry. Trim "doughboy" shape for all-around protection.

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for your copy of this descriptive M.S.A. Skullgard Bulletin. Fully detailed—ask for Bulletin No. DK-11.

MINE SAFETY APPLIANCES CO.

BRADDOCK, THOMAS AND MEADE STREETS

PITTSBURGH, PA.

DISTRICT REPRESENTATIVES IN PRINCIPAL CITIES

(Continued from page 101)

eliminated the necessity of underpinning the remainder of the Investment Building.

On the three remaining sides of the lot the problem of bank support was less important. On 16th St. the new building is set well back from the street. On K and L Sts. the banks sloped and were temporarily protected by wooden spur braces, and the new footings were installed through the toe of the slope. A small section of gridsheet protection was used on L St. where three areaways required excavation well beyond the building lines. Despite the fact that excavation was carried to a depth of more than 30 ft. along the street lines, no movement was noted in any of the streets.

Pumps Remove Ground Water

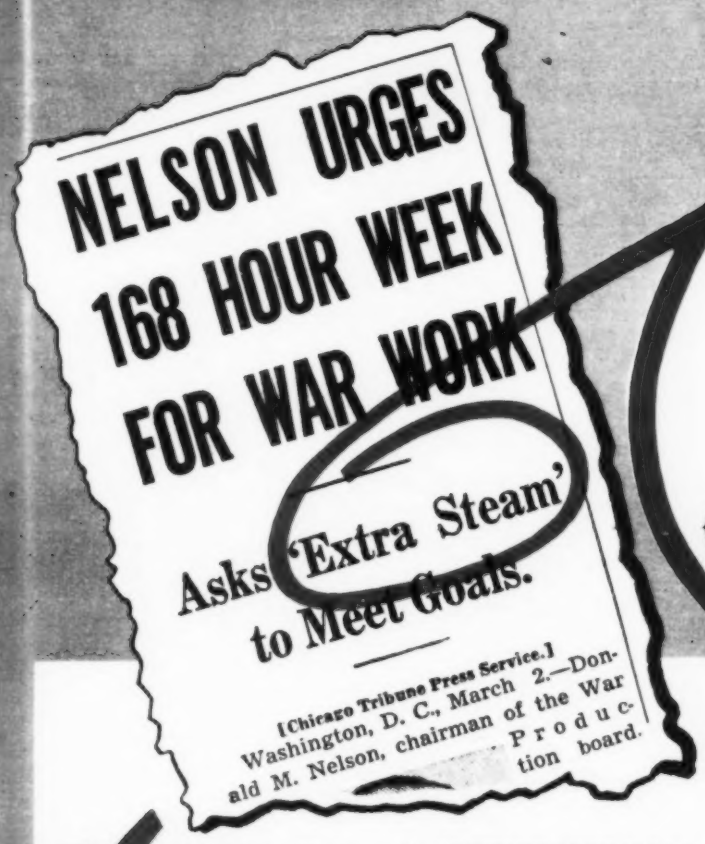
Although boring tests furnish accurate information as to water levels, they give little indication as to the volume of water or the behavior of the water-bearing material. The blue clay was practically impervious, and although it carried small quantities of water in sand seams, the only difficulties above the gravel level resulted from surface water. Early in July it rained nearly every day, and this rain water could not run off through the clay. A central sump and pumping plant had been designed to handle the ground water, and with this in place all water was readily handled. The surface water was carried to the sump through a series of ditches, and soft clay on the surface resulting from the rains was scraped off by the bulldozer. When the excavation in the boiler room reached a depth of 35 ft. the central pumping plant was operated continually day and night.

The new foundation consists of concrete footings bearing on coarse sand and gravel. The top of this stratum varied from depths of 30 to 35 ft. below the street, and generally the footings were placed at this level. In the boiler room, where certain of the footings were as much as 50 ft. below street level, rock was encountered. The rock in this vicinity, however, has a bearing value about equal to that of the sand and gravel.

Each column for the large hotel structure is supported on a slab of concrete heavily reinforced by steel rods. Along the east side, where adjoining property prevented encroachment beyond the building lines, as many as four columns rest on a single footing 25x28 ft. square and containing 160 cu.yd. of concrete. Finally, the cellar walls were constructed of reinforced concrete. However, massive as are these walls, they could not have stood unsupported against the tremendouus pressures of the banks. It was necessary to leave in place the gridsheet beams until the floor at the street level was construucted. As this is written, they are still there, carrying their heavy loads, though the cellar digger has long since left the job, and the steel superstructure is rapidly working skyward.

The material excavated for the founda-

(Continued on page 104)


NELSON URGES
168 HOUR WEEK
FOR WAR WORK

Asks 'Extra Steam'
to Meet Goals.

[Chicago Tribune Press Service.]
Washington, D. C., March 2.—Donald M. Nelson, chairman of the War Production board.

For "Extra Steam"
on Construction Jobs, You
Can Depend on INTERNATIONAL
TracTracTors, Mr. Nelson!

Make Use of INTERNATIONAL'S Preventive Maintenance Program

This program has one aim: the inspection of all TracTracTor wearing parts, at scheduled intervals, to help prevent wear before it starts, to greatly reduce operating costs, and to keep your TracTracTors at work with minimum time out for repairs. . . . Money-saving, time-saving, convenient, efficient.

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These manuals are valuable guide books on tractor care, operation, adjustment, maintenance. There is a separate manual for each TracTracTor model. Study your copy carefully; use it regularly.

INTERNATIONAL TracTracTors all over the nation are responding to increased production demands with lots of *extra* push and pull. They're working around the clock on many rush construction jobs. Often they're working *three* shifts, instead of one, doing *three* times as much work as they did before.

This calls for closer attention to SERVICE than ever before. It emphasizes the need for a regular, scheduled program of PREVENTIVE MAINTENANCE.

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Rugged strength—simple design — positive action — durability — compactness are all important features.

The open type fits the same leads and uses the same accessories as the Vulcan Single-Acting Pile Hammers.

Sizes 18C—30C—50C—80C meet all needs

VULCAN IRON WORKS Since 1852

331 North Bell Avenue

Chicago Illinois

Continued from page 102

tion of the hotel weighed about 135 lb. per cu. ft., so that the 80,000 cu.yd. removed weighed more than 145,000 tons, which is nearly four times the weight of the entire hotel above the ground level. The concrete in the foundations and walls totaled 9,000 cu.yd. and weighed 19,000 tons.

Personnel

For the new Washington Statler Hotel Spencer, White & Prentis, Inc., of New York City, were subcontractors for the excavation, sheetpiling and underpinning, with Joseph C. Weaver and Harry Armstrong, serving as superintendents, and Donald B. McKinley, civil engineer. The excavation work was sublet to Potts & Callahan Contracting Co. Inc. The general contractors for the project are John W. Harris Associates Inc., of New York, whose superintendent is Andrew Leith. The architects are Holabird & Root, represented on the site by L. Carnahan. The Hotels Statler Co. is represented by I. N. Simon.

★ ★ ★

IMPROVED EQUIPMENT BUILDS *Monolithic Brick Pavement*

Continued from page 51

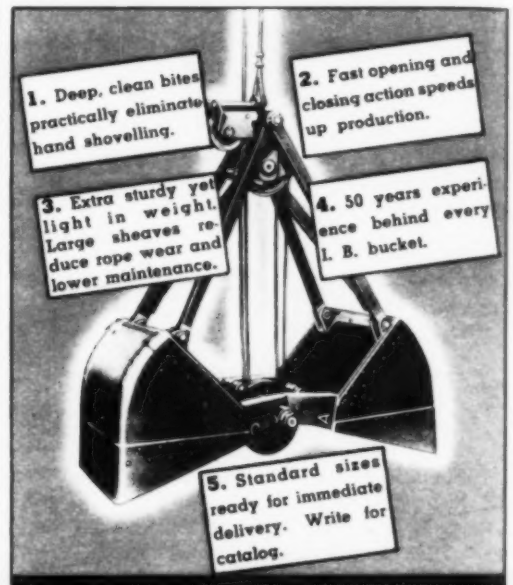
between the two lanes a ⅛-in. premolded asphalt-saturated ribbon 3 in. deep, equal to the depth of the wearing course.

Concrete Base—Concrete mix for the base was designed with a cement content of 4.75 sacks per cu.yd. Batches of 28.42-cu.ft. volume containing 5 sacks of cement were mixed and placed by a Koehring 27E paver operating outside the forms. Subgrade was trimmed to accurate profile by a Flynn subgrader equipped with crawler traction treads which traveled on Heltzel steel edge forms 9 in. deep. When working on the second land, crawler treads at the inner side of the machine rode on steel protecting angles covering the edge of the completed brick surface of the first lane. Inside wheels of the finishing machines behind the paver were changed from flanged to smooth to ride on completed pavement when building the second lane.

Two Flex-Plane single-screed finishing machines followed the paver. The first machine was a gas-electric unit carrying a vibratory screed equipped with an adjustable blade which struck off the first

Continued on page 106

5 REASONS WHY PRODUCTION MINDED MANUFACTURERS DEMAND I. B. BUCKETS


1. Deep, clean bites practically eliminate hand shovelling.
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Send for it today . . . no obligation . . . describes performance-proved methods for effectively cleaning tractors, trucks, road building equipment; safely de-scaling Diesel water jackets, water-cooled compressors, etc.; easily removing tar, paint.

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Bigger ~~BIG~~ PAY LOADS with the New #3½ Smith-Mobile!

May be mounted on relatively light, 2-axle truck, if desired.

9 CU. FT. GREATER DRUM VOLUME

165 cu. ft. drum volume of No. 3½ Smith-Mobile permits bigger payloads.

...and yet Smith-Mobile WEIGHS LESS

More Profit Per Load!

Now — you can mix and deliver more concrete on every trip by using the new No. 3½ Smith-Mobile Truck Mixer. It has a drum volume of 165 cu. ft. . . . *nine cubic feet more than competitive 3-yard mixers.* This additional pay load capacity gives ready-mixed concrete operators EXTRA PROFITS with every load. In spite of this big feature, the new No. 3½ Smith-Mobile weighs less than competitive 3-yard machines. Actually, it does NOT require the 6-wheel truck shown in the illustration above, except for unusual load or ground conditions. A relatively light, 2-axle truck is usually all that's needed.

Then consider Smith-Mobile's many other features: HIGH DISCHARGE without hoist . . . CONTROLLED DISCHARGE without segregation . . . VISIBLE MIXING . . . FEED CHUTE CHARGING . . . etc., *the ONLY truck mixer with all these features.* Be sure to get your copy of the new Smith-Mobile Catalog No. 198-B.

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SMITH

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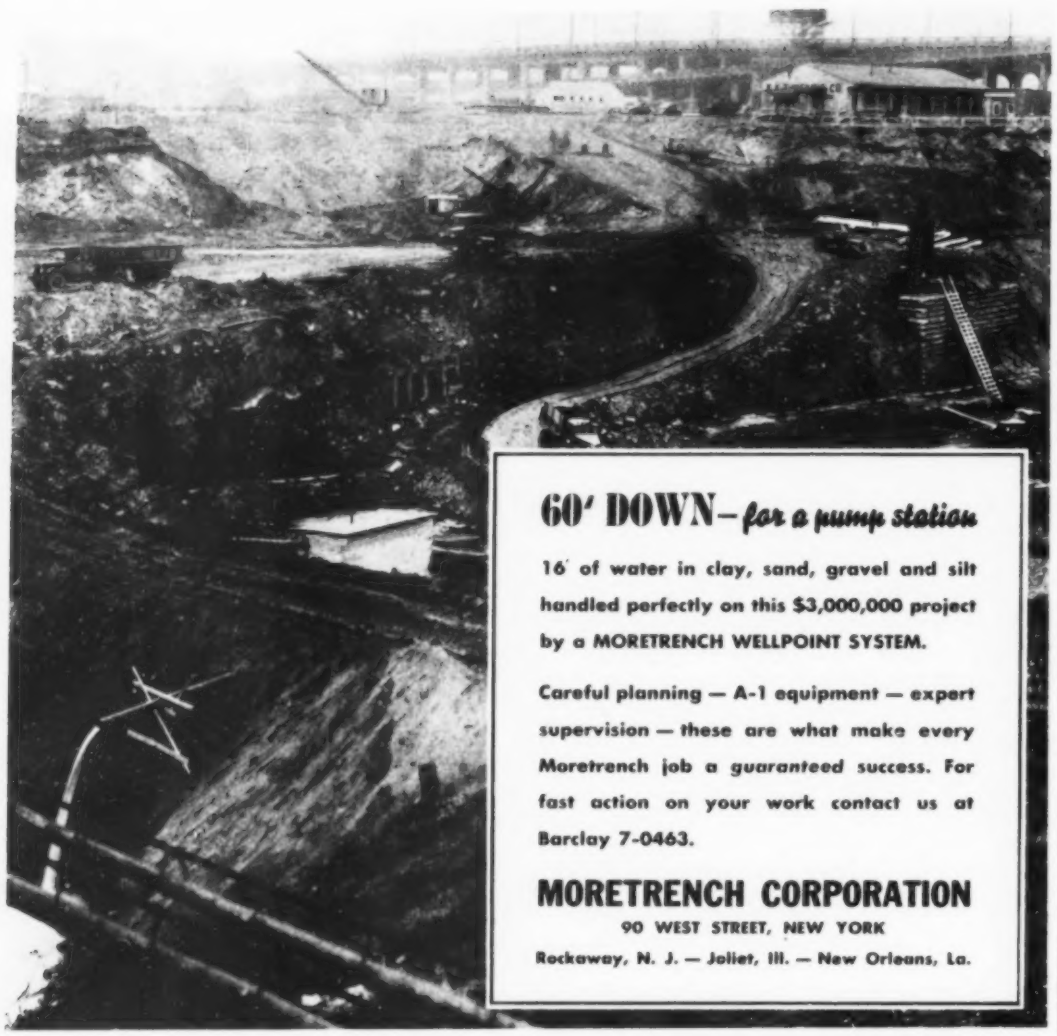

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16′ of water in clay, sand, gravel and silt handled perfectly on this $3,000,000 project by a MORETRENCH WELLPOINT SYSTEM.

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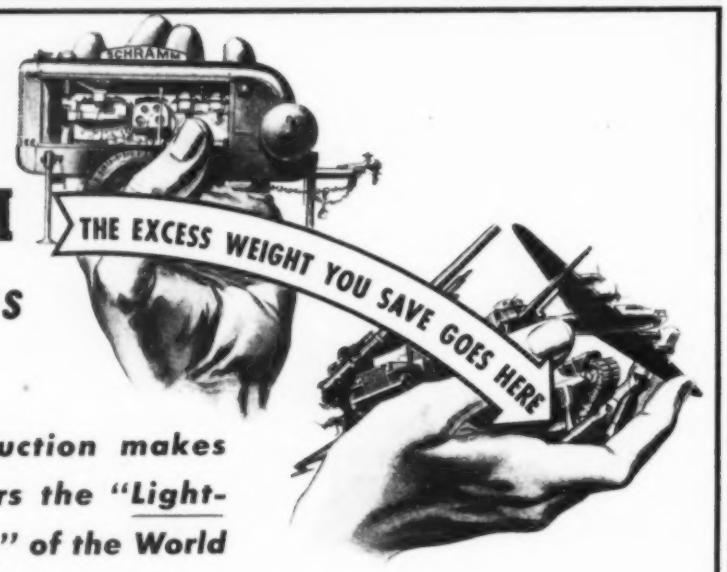
When you Specify SCHRAMM Compressors



Design in Construction makes these Compressors the "Lightweight Champions" of the World

Without sacrificing an ounce of pressure or a day of hard-hitting useful life Schramm gives you a compressor with a weight saving up to 40% . . . Take a look at the straight-in-line vertical cylinders, cast en-block — a compact arrangement that makes for streamlining and releases critical materials which are so badly needed in our present crisis. So, for any job that requires compressed air—Drilling, Concrete Breaking, Tamping, Demolition, Trench Digging, Pile Driving, Riveting, etc., specify Schramm—the Lightweight Champion that can step out of its class and take on the toughest of them.

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SCHRAMM, INC. WEST CHESTER, PA. DEALERS IN PRINCIPAL CITIES

(Continued from page 104)

layer of concrete 2 in. low for the placing of steel reinforcing mat. No vibration was employed in striking off this layer. On its later pass to strike off the top course of concrete covering the reinforcement, the screed of the finishing machine was vibrated by two 1½-hp. electric vibrators operating at 3,600 r.p.m.; the vibrators drew their power from a Master generator on the machine. A gasoline-powered finishing machine following the gas-electric unit completed the mechanical finish of the base.

Premolded bituminous filler ¾ in. thick in the expansion joint assemblies for the base was set with the top of the filler 1 in. below the surface of the concrete, and the upper 1 in. of the joint was closed temporarily with a metal cap which remained in place until after the final pass of the second finishing machine. The finishers removed the cap and set in the joint on top of the filler a temporary form 3½ in. high to keep the joint clear while brick were being placed and grouted. Not until the brick had been vibrated and grouted, and the grout had set sufficiently, was this temporary form removed from the joint. In pulling the form, care was taken to avoid breaking the bond of the brick with the base. After the temporary form had been removed, the upper section of bituminous fiber filler extending to within 1½ in. of the surface and within 1½ in. of the edge of the pavement was inserted in the joint. Sealing of the joint with hot-poured rubber compound followed some time later after the second lane of the pavement had been cured.

Brick Surface

Brick was laid on the base while the concrete was still plastic, within 1 to 3 hr. after the concrete had been placed, the time lag being dependent on temperature and atmospheric conditions. In advance of the brick-laying crew, the steel edge forms of the pavement were built up by the addition of a second lift. Specifications required that the top of the raised form be at least ½ in. above the surface of the brick wearing course; the contractor actually used curb forms 6 in. high which cleared the brick surface by 3 in. Wheels of a rolling brick conveyor and of the vibrating machine traveled on this upper rail of the forms.

Metropolitan de-aired wire-cut lug paving brick for the wearing course were in two sizes, a standard size for ordinary paving and a special shape for lip curb. The standard size was 3 in. deep by 4 in. wide by 8½ in. long, with 3/16-in. lugs on one side and both ends. Specifications tolerated variations of not more than ⅛ in. in the two lateral dimensions nor more than ¼ in. in length. Special edge brick 4 in. wide for the lip curb were 9 in. long by 3⅛ in. deep at the inner end and 6⅛ in. at the outer end.

Brick were stacked in advance on the shoulder of the road and were covered to

(Continued on page 108)

IT'S JUST HORSE SENSE ALL WHEEL DRIVE and STEER IS THE RIGHT ANSWER!

● The All-Wheel Drive and Steer features of the "99M" and "88M" give these A-W Power Graders marked *load handling* and *blade control* superiorities. Both graders use the full traction of front and rear wheels. There is no idling front end to slow the grader, or cause the blade to fall away when the going gets tough. Instead the full horsepower is applied productively in moving full loads with "hairline" control of direction regardless of "side draft." Furthermore, with front and rear wheels set to steer just where the operator wants them, he can always utilize the most effective traction.

The inevitable superiority of these A-W "99M" and "88M" features makes itself felt in greater quantity, quality and variety of work . . . whether plowing, cutting down a bank, moving windrows up a slope, or doing heavy maintenance or oil mix. So, it's just plain horse sense to make your next grader an A-W "99M" or "88M". Only these machines have the All-Wheel Drive and Steer features that assure you controlled power for maximum speed of output under all conditions. THE AUSTIN WESTERN ROAD MACHINERY CO., Aurora, Illinois.

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Austin-Western
POWER GRADERS

MOTOR GRADERS • BLADE GRADERS • ELEVATING GRADERS
SCRAPERS • CRUSHING AND SCREENING PLANTS • ROLLERS
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Of course they judge on how quickly it buries itself for a big pay load, how it swings without spilling, to dump smoothly and cleanly into the waiting truck. They don't know, as the contractor's superintendent does know, how long Williams Buckets last with little maintenance expense, and how well they deliver on the toughest hardpan jobs or handle rubble or concrete chunks.

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WILLIAMS *Buckets*

***built by* WELLMAN**

PORTABILITY *and* CAPACITY

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Model PA plants are ideally suited to this type of work as they can be quickly set up and will produce large tonnages economically.

●

A limited number of these plants are available to defense contractors on short delivery.

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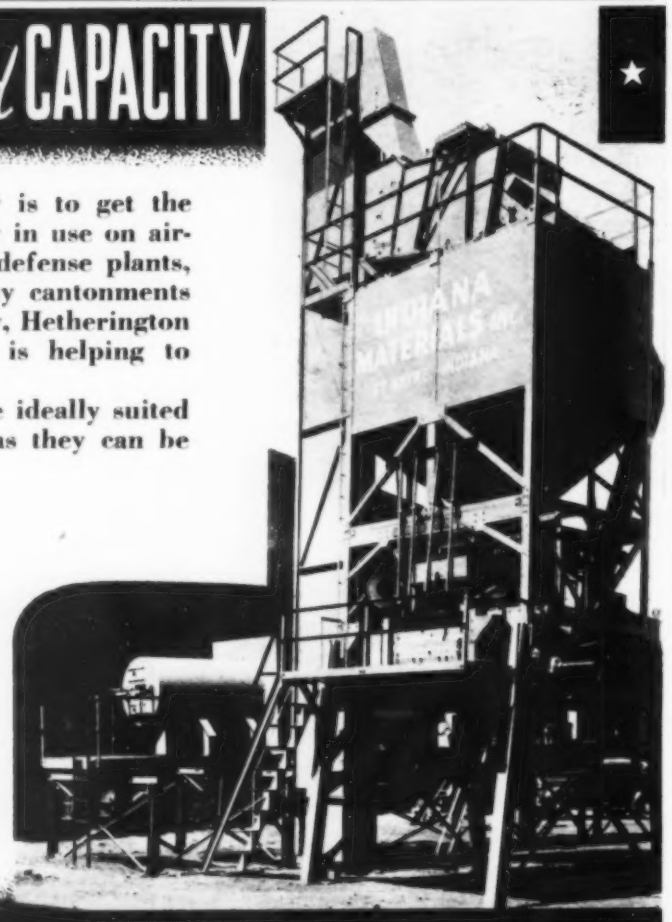
Inquiries are invited.



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ENGINEERS AND MANUFACTURERS

701-745 KENTUCKY AVENUE INDIANAPOLIS INDIANA

(Continued from page 106)

protect them from earth cast across the stack by the discharge conveyor of the finegrading machine. Laborers fed brick from the stack to a gravity roller conveyor which delivered the paving units across the 12-ft. lane to two droppers who laid the courses from the center line to the outer form or to the lip curb brick, where required. Bats of not less than 1/3 brick were used in starting alternate courses and in completing courses at the outer edge of the pavement.

Two droppers laid about 90 lin.ft. of 12-ft. lane per hour. When faster laying was desired, a third dropper was started at the first expansion joint ahead of the two-man team. Ribbon-type filler for the center-line longitudinal joint was installed during the paving of the second lane, the premolded ribbon being held in place by temporary brick until permanent starter brick could be laid against it.

Vibrating Machine

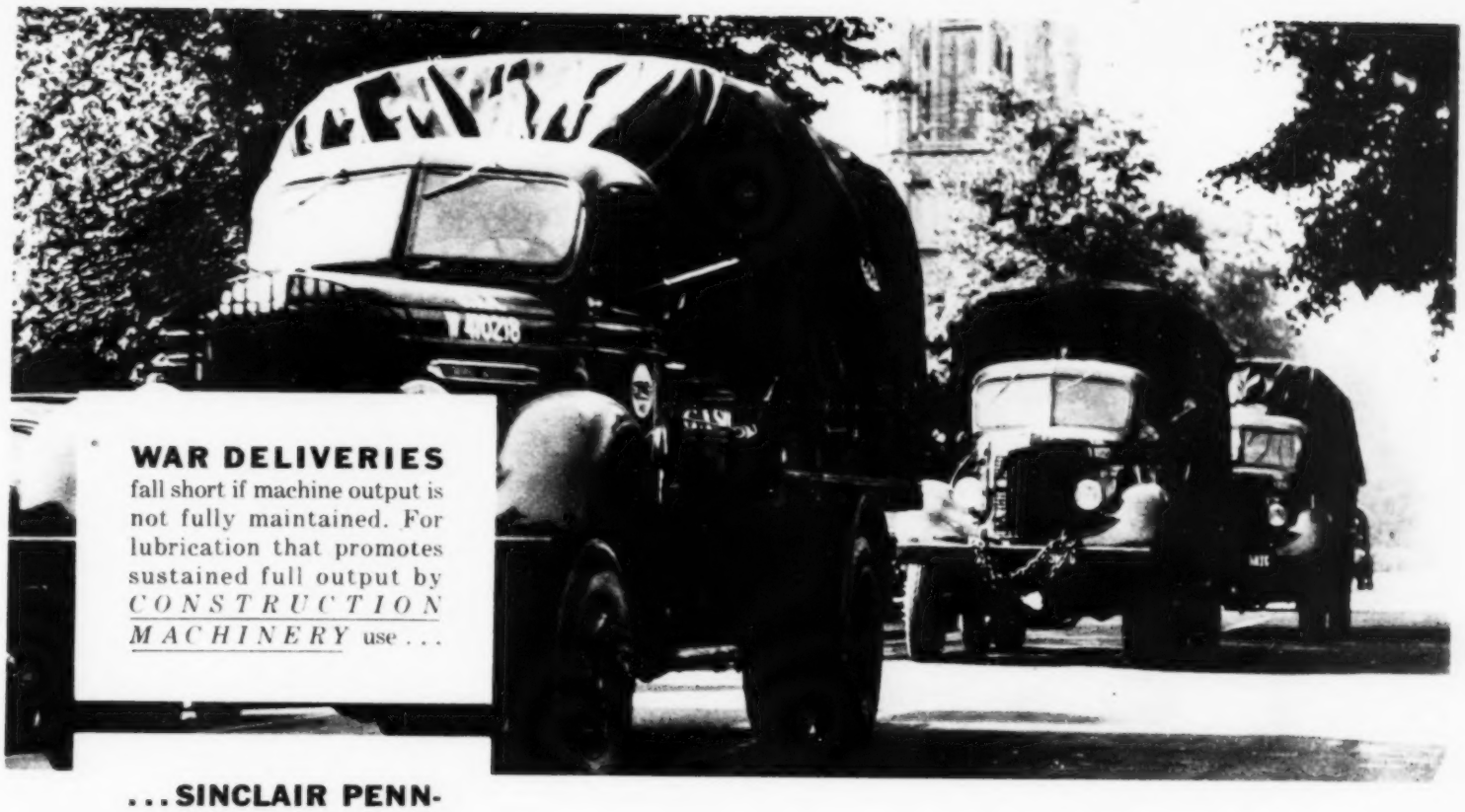
In advance of the vibrating operation, inspectors marked unacceptable brick for removal and replacement. A Heltzel self-propelled vibrating machine capable of moving in either direction embedded the brick in the plastic concrete. Under the frame of the machine was suspended a series of longitudinal pads comprising eleven shallow heavy-duty channels 8 ft. long connected into a vibratory unit by a pair of transverse tierods passing through the flanges of the channels; rubber gaskets on the rods in the narrow openings between flanges of adjacent channels separated the vibratory pads from one another. The entire vibratory unit was suspended by eight coil-spring-and-chain hangers from two pipe windlasses on the frame of the machine. When lowered on to the pavement for operation, the full weight of the unit rested on the brick. At both sides of the machine, lateral ties held the multiple-channel vibratory unit in alignment.

Vibration was imparted to the steel pads through a transverse channel laid across the center of the unit and bolted to welded angles on the two outer longitudinal channels. On the transverse channel were mounted three vibrators driven by Master ¾-hp. electric motors at 3,450 r.p.m. A Master generator on the machine furnished power to the motors. Several of the accompanying photographs illustrate the construction of the vibrating machine.

By virtue of the full-floating characteristic of the vibratory unit, the longitudinal channels automatically conformed to the pavement surface and made transitions from flat to crowned sections without any adjustment by the operator. The bolted connection of the outside longitudinal pad to the transverse channel could be adjusted quickly to permit the outer panel to vibrate lip curb brick.

Two forward speeds were available on the machine. When vibrating brick, the machine traveled at the slower speed, about 11 ft. per min. Vibration under the

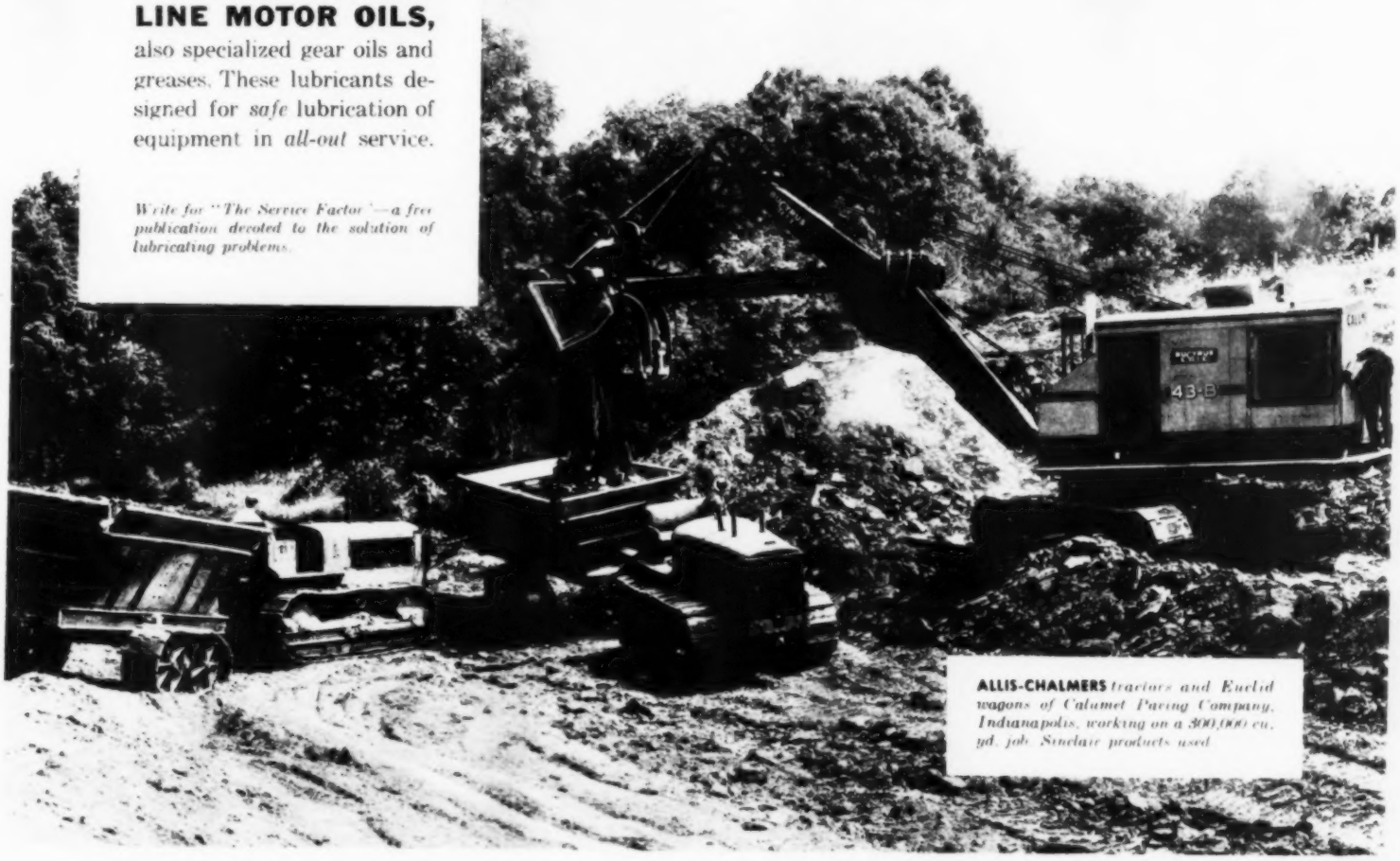
(Continued on page 110)



WAR DELIVERIES
fall short if machine output is not fully maintained. For lubrication that promotes sustained full output by *CONSTRUCTION MACHINERY* use . . .

. . . SINCLAIR PENNSYLVANIA and OPALINE MOTOR OILS,
also specialized gear oils and greases. These lubricants designed for *safe* lubrication of equipment in *all-out* service.

Write for "The Service Factor"—a free publication devoted to the solution of lubricating problems.



ALLIS-CHALMERS *tractors and Euclid wagons of Calumet Paving Company, Indianapolis, working on a 300,000 cu. yd. job. Sinclair products used*

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WAR PROJECT—858,000 sq. ft. of VACUUM-processed floor and roof slab. (Ninth VACUUM project for this contractor in two years!)

TIME: Mid-summer concreting speed maintained all winter, despite low temperatures.

Forms stripped in 3 days. VACUUM-processing doubles 3-day strengths).

Partitions, mechanical trades, etc. followed concrete days earlier.

MONEY: With pours averaging 12,000 to 24,000 sq.ft. per day, four days gained on stripping by using VACUUM CONCRETE meant 50,000 to 100,000 sq. ft. of forms saved.

Less labor to finish slabs.

No dust coat or "drier" needed for monolithic finish.

Simplified winter protection.

No priorities; no delays. VACUUM-processing equipment is furnished on a rental basis, from adequate stocks, the day you want it! We furnish full time supervisor at our own expense, to train your men in operation of process.

Write for List of Typical VACUUM CONCRETE Projects

VACUUM CONCRETE, INC.
4210 SANSOM STREET
PHILADELPHIA, PA.

(Continued from page 108)

channel pads settled the brick into the plastic concrete to a depth of about ⅛ in. and worked mortar up into the brick joints for ¼ to ¾ in.

Grout Filler

Behind the vibrating machine, inspectors checked the condition of the brick and tested the smoothness of the pavement with a surface checker set to the specified tolerance of ¼ in. in 10 ft. After this inspection, joints between the brick were filled with sand-cement grout to complete the monolithic construction of the rigid, brick-surfaced pavement.

Grout filler made up in the proportions of 200 lb. of sand and 7 gal. of water to each sack of cement was mixed in 20-sack batches by a Jaeger 3-yd. side-discharge truck mixer. Before any grout was applied to the pavement, a workman with a sprinking can sprayed water on the surface to wet the brick thoroughly. To distribute the mixed grout, the side-discharge truck mixer moved alongside the lane being paved and spread the joint filler on the brick surface with a chute. As many as four workmen with wooden hand screeds, or lutes, worked the grout into the joints.

Grout distributed in the first application settled in the joints and filled them to within about 1 in. of the top. As soon as this settlement had occurred, the truck mixer repeated its trip alongside the pavement to spread additional grout. Sometimes a third application was necessary to fill the joints flush with the surface.

Before the grout took its initial set, a workman went over the surface of the pavement with a rubber squeegee to remove excess filler. The pavement then was covered with wet burlap which remained in place until the following morning. Curing was continued for six additional days under wet straw.

Progress

Reinforced-concrete base for a 12-ft. lane was completed at average rates of 100 to 110 ft. an hour. As already noted, two droppers laid brick in a lane at 90 ft. an hour, and this progress was accelerated when desired by employing an additional dropper ahead of the other two. The contract called for 47,800 sq.yd. of 9-7-7-9-in. reinforced-concrete base and 3-in. monolithic brick wearing course. With drainage, structures and other items, including 131,000 cu.yd. of unclassified roadway excavation and 17,500 cu.yd. of classified embankment material for 18-in. blanket course under a large portion of the pavement, total value of the contract amounted to nearly $350,000.

Direction

Hal G. Sours is director of the Ohio Department of Highways, and T. W. Kinnear is chief engineer of construction. The monolithic brick pavement on U. S. 21 south of Barberton was built under the general supervision of Homer E. Ander-

ASK for the ONLY SHOVELS *with* Blade Edges GUARANTEED SPLIT-PROOF

INGERSOLL SHOVELS
"The Borg-Warner Line"

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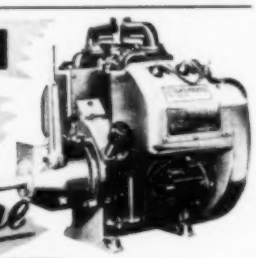


Model VE-4, 22 hp. 4 cyl., V-type Engine. Other types and sizes: 1 and 4 cyl., 1 to 35 hp.

X

"Old enough to vote", in terms of continuous production and development, Wisconsin heavy-duty air-cooled engines have also definitely come of age from the standpoints of industrial recognition and acceptance.

It has taken the hard proof of service, under the most trying operating conditions, in many lines of industry and power applications . . . to convince designing engineers, equipment manufacturers, and tough-skinned users that AIR-COOLED ENGINES, properly designed and built, cause less trouble and provide higher productive capacity than any other type of internal combustion unit within 35 hp. limits

More than 300 machine manufacturers use Wisconsin Heavy-Duty Air-Cooled Engines as standard power equipment . . . covering your field as well as many others.

MOST POWER Per POUND
WISCONSIN MOTOR Corporation
MILWAUKEE, WISCONSIN, U. S. A.
World's Largest Builders of Heavy-Duty Air-Cooled Engines

son, division engineer, Ravenna, Ohio, and of William M. Wardman, assistant division engineer, with L. L. Luke, project engineer, in charge on the job. For the Lewis & Frisinger Co., contractor, Ann Arbor, Mich. C. J. Carrol, superintendent, directed the work.

★ ★ ★

Widening Finisher

Operates on Concrete Strip

(Continued from page 55)

dled by the finishing machine operator, one lute and one edger.

Material from the paver was fed through a spreader box, equipped with vibratory pan, drawn by the paver and sliding on the form and one edge of slab. Water was supplied from a tank mounted on a trailer which was also drawn by the paver. The widening finisher, following under its own power, struck off and finished the strip. This machine is a small finisher designed for work up to 6 ft. wide. It is equipped with two-speed transmission for working speeds up to 18 ft. per min. and screed speed up to 50 cycles (100 strokes) per min. Power is supplied by a 4-5 hp. air-cooled engine. Brooks Construction Co. completed more than 50 mi. of widening strip during 1941 with the set-up illustrated in the accompanying photographs.

★ ★ ★

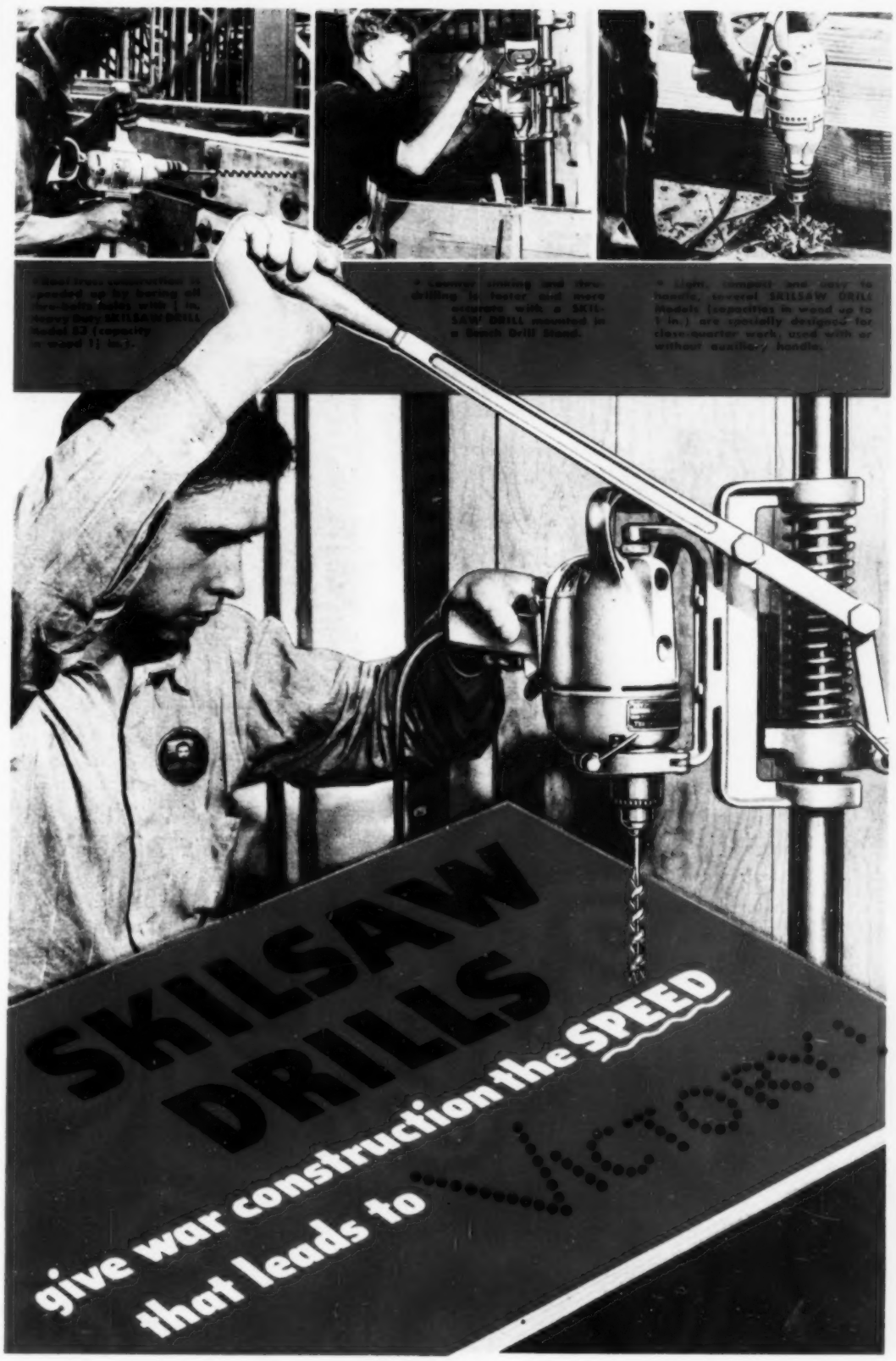
Asphalt Strips

Produce Tight Joints in Multi-Plate Siphon

(Continued from page 58)

¼ in. thick and 5 in. wide and carried a backing of tar paper. To avoid leakage in the finished joint it was found necessary to remove this tar paper backing before placing the asphaltic strip along the seam and bolting up the connection. When three thicknesses of metal came together, a double thickness of asphalt strip was installed to fill completely the gap in the corrugation of the metal.

In the asphalt strips along the sides of the pipe, holes to receive bolts were made with a tapered punch and the strip then was tied with string to the curved plate at 12-in. intervals, ready for bolting up and forming a watertight seal. The punch was frequently dipped in a pail of water to prevent the asphaltic strip material from sticking to it.



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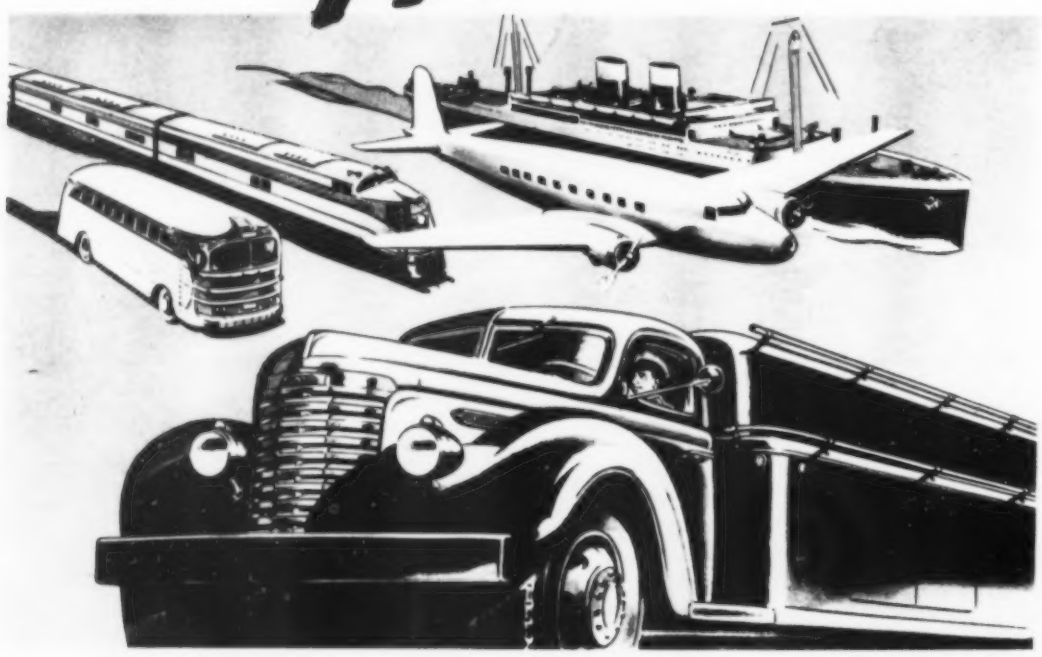
PREVENTIVE MAINTENANCE PAYS!



For years, airlines, ship lines and rail lines—as well as America's leading truck and coach fleet operators—have practiced preventive maintenance to get the most efficiency and mileage from their equipment. GMC "Victory Maintenance" is preventive maintenance, *plus*. It can reduce service costs and time out for repairs. It can increase operating economy. And, most important of all, it can add many months and miles to the life of your equipment. Whether you own one truck or a fleet you will want to take advantage of this wartime, truck-saving program. See your local GMC branch or dealer today.

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GMC VICTORY MAINTENANCE KEEPS YOUR TRUCK ON THE JOB

THE TRUCK OF VALUE **GMC TRUCKS** GASOLINE -DIESEL

Timber Connectors

Feature

Truss Fabrication

(Continued from page 60)

One of the most dramatic illustrations of this new timber engineering method is the 49x44-ft. portable workshop which has been set up at Camp Bunyan, 40 mi. north of Westwood. Five 47-ft. simple Fink trusses, set 14 ft. on centers, will be used in its construction. When completed, the workshop will house a traveling crane, repair and service equipment for 22 diesel logging trucks and logging equipment sufficient for the daily delivery, ready for rail haul, of a million feet of logs. Yet the timber connector system used in its construction makes it possible to dismantle the building and set it up elsewhere with little difficulty.

Because of the heavy winter snows at Westwood, a live load of 60 lb. per sq.ft. was assumed in designing most of the structures mentioned. This corresponds to a snowfall of about 6 ft. Red River Lumber Company engineers, working with the assistance of the Timber Engineering Co. of California, designed the buildings, some of which were built by private contractors and some by Red River construction crews.

★ ★ ★

Levee Banks Paved

With

Asphaltic Concrete

(Continued from page 54)

sire for (a) flexibility under the wide range of temperatures and (b) an ample supply of the volatiles to insure long life. The material was spread and compacted at a temperature of about 200 deg. F. As spreading progressed, the wire mesh used for reinforcing was lifted with rakes to approximately the center of the slab. Prior to dumping "hot stuff," the wire mesh was attached to the 2-in. anchors by wired connections. It was found preferable not to make these connections too tight as there was advantage in allowing the reinforcing freedom for slight movement resultant from adjustment and temperature changes.

The District has pioneered in this type of revetment. Experiment with asphaltic concrete began some 6 years ago and to date some 350,000 sq.ft. has been laid in bank protection work.

The project was carried out by the Los Angeles County Floor Control District, H. E. Hedger, chief engineer; G. V. Bittman, construction supervisor.

Independent Boom Control

On this big defense job Koehring Cranes were an important factor in the high speed building construction. Koehring Cranes swing or travel while raising or lowering the boom. This important advantage saves time when handling material, setting steel or forms, spotting concrete buckets. Booms may be lowered by power for safe and positive operation. Adjustable jib boom, power controlled, and collapsible gantry frame, power controlled, are other important time-savers. When high speed, safe operation is necessary, Koehring Cranes have advantages to help speed building construction.

KOEHRING COMPANY
MILWAUKEE • WISCONSIN

KOEHRING HEAVY DUTY

HEAVY-DUTY CONSTRUCTION EQUIPMENT

IN A HURRY? DEPEND ON JACKSON EQUIPMENT

Every Supply House carrying Jackson equipment knows what contractors are up against these days. Speedy delivery is now as important as correct design, high durability and price. The Jackson distributor has all these advantages — Get in touch with him today.

TYPE M11 CONTRACTORS BARROW

Preferred by many contractors because of their narrow, large capacity trays. Built to take rough treatment and long exposure. Available also with steel tubular frames and steel wheels. Standardized production assures lowest price consistent with high quality.

TYPE 88 CONCRETE CART

A perfectly balanced, easy to wheel vehicle with drop axle, roller bearings and pneumatic tires. Design and construction of bodies prevents opening at seams. Made oversize to give full six and one-half cubic feet wheeling capacity.

STEEL MORTAR MIXING BOXES

Formed from a single sheet of steel with corners lapped, riveted and reinforced with malleable iron sections. Bottom and sides are smooth inside and permit the material to be mixed and emptied with minimum effort. Made in three sizes.

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HARRISBURG, PENNA.

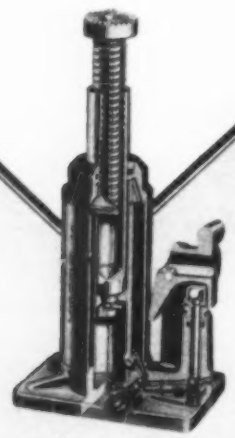
SUPERIOR PRODUCTS SINCE 1876 — JACKMANCO

You Can't Have Too Many Simplex Jacks!

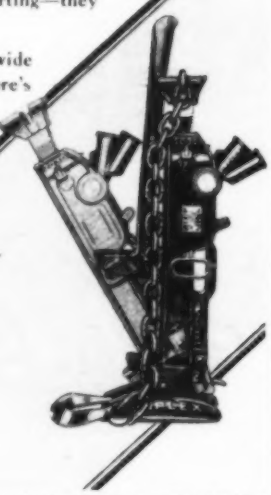
Don't get caught short! Uses for Simplex Jacks on any construction job are practically limitless. You can't list the needs, for a new one is continually popping up—an operation you couldn't possibly perform without plenty of powerful, rugged, easily-operated jacks; and that means Simplex Jacks. Lifting, lowering, pushing, moving, supporting—they help you get the toughest jobs done quickly—safely—efficiently.

Three types—Lever, Screw and Hydraulic—available in a wide range of styles and capacities. Whatever the requirement, there's a Simplex Jack to do it.

Simplex Screw Jacks have tough malleable bases — self-leveling cap with 9° float — single large chrome-moly steel ball that reduces friction 88% — safety peep hole prevents over-extension. 38 sizes with 4-way head; 19 sizes with ratchet head.



Simplex Hydraulic Jacks feature safer pressure-tested malleable iron base and top nut — release valve shielded against breakage — Neoprene non-deteriorating packing seals. 3—20 tons capacity.



Simplex Lever Jacks have Gold Medal Award for Safety Mechanism. Every one is guaranteed to lift full capacity on cap or toe lift. Unbreakable trunnions—no fulcrum pins. Expansion rivets—no machine screws to come loose. 5 to 20 ton capacity. (Geared jacks to 35 tons, Journal jacks to 50 tons.)

Templeton, Kenly & Co.
CHICAGO, ILL.
Better, Safer Construction Jacks Since 1899

Simplex Jacks
A better Jack for every job — many jobs for every Jack

Flight Strips

Along Highways Will Aid Aircraft Landing and Take-Off

(Continued from page 53)

Public Roads Administration in the field, to assist in the actual construction and development of flight strips, in accordance with the directions furnished by the Army Air Forces. Reports will be submitted showing the sites approved, and recommendations as to the additional number of flight strips which should be provided for will be sent to the authorities in Washington through proper channels.

During the first three weeks of this month Harold E. Hilts, chief, Division of Highway Transport, Public Roads Administration, attended joint meetings of Air Force officers and Public Roads officials in New York State, for the First Air Force area, in Florida, for the Third Air Force area, and in California, for the Second and Fourth areas, to formulate plans for the location and development of flight strips in those areas. This splendid cooperation by the Public Roads Administration is appreciated by the Headquarters, Army Air Forces.

As this program unfolds and plans are developed, joint meetings will also be held with Army Air Force officers at the large pilot training centers throughout the country. Every effort will be made to insure that the location and development of flight strips will keep pace with the expanding training program, so that there

Administrative Set-Up

The administrative set-up under which the flight strips program will function constitutes an obvious departure from methods formerly used in constructing landing areas for aircraft. It vests the job of actually building flight strips, which were designed to be a part of the public roads system, in the Public Roads Administration. In my opinion the plan which has been devised is workable and efficient. The Public Roads Administration is a nation-wide organization of sound and competent men, experienced in a type of construction similar to that required for landing areas. They enjoy the cooperation of the state highway departments, and will be furnished with all the technical assistance which the Army Air Forces can give them. They have already demonstrated an eagerness to do their job quickly and well. I am confident that the Public Roads Administration, with the help of the Army Air Forces and civilian organizations such

(Continued on page 116)

A "MUST" FOR MILES OF OUR STRATEGIC HIGHWAYS

This narrow, wornout section of a strategic highway will slow down troop and supply movements.

The same highway, widened from 18 to 30 feet and resurfaced with TEXACO Asphalt paving.

Over every mile of highway in our strategic network, our fighting forces and their supplies must be able to move at maximum speed at all times.

Mention of this "must" focuses attention immediately on those narrow, wornout sections of our strategic highways, which tend to reduce the speed and efficiency of troop and supply movements.

In peace time, large mileages of such highway bottlenecks have been eliminated by the simple, effective method of widening and resurfacing with hot plant-mixed TEXACO Asphalt paving. The resilient, durable, easy-riding pavements obtained by this method have demonstrated their ability time and again to serve the heaviest kind of traffic for many years.

Thoroughly proven in peace time, the elimination of highway bottlenecks by widening and resurfacing with TEXACO Asphalt is equally sound practice in time of war.

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NOW you can get 10 basic books of

DAY-IN-DAY-OUT VALUE TO THE CIVIL ENGINEER

in one handy volume that—

...answers your questions in *any* division of civil engineering;

...is comprehensive, up-to-date and authoritative;

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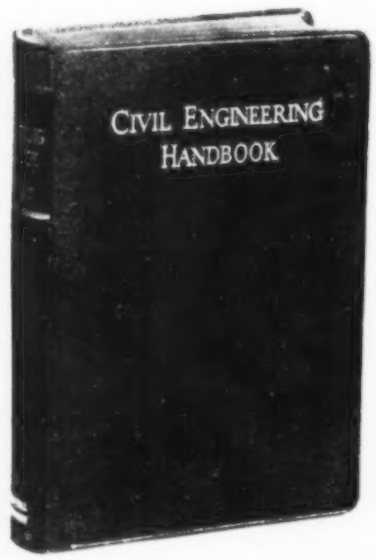
CIVIL ENGINEERING HANDBOOK

Editor-in-chief: Leonard C. Urquhart, Professor of Structural Engineering, Cornell University. Second Edition, 870 pages, 6 x 9, over 900 illustrations and diagrams $5.00

HERE are the fundamentals of the various subdivisions of civil engineering for men who actually plan, select, design, and construct civil engineering structures and projects. In each division a noteworthy specialist has contributed a compact treatise, developing fundamental theories as well as stating more involved ones, making the book not only a comprehensive reference work of modern civil engineering practice, but also adaptable for systematic study of any of the fields represented in it.

In this new edition you will find latest surveying practice carefully defined; new developments in highway and railroad work thoroughly covered; specialized recent data on design and construction of framed structures; new specifications for concrete and steel design to conform to latest approved specifications; important new data on foundations, sewerage and water supply.



Here in one handy volume is the practical, up-to-date information you need on:—

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–Construction costs of roads and pavements
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–Pipes and open channels
–Flow of viscous fluids
–Measurement of flowing water
–Roof trusses
–Dead-load stresses in bridge trusses
–Lateral forces on bridge trusses
–Arches
–Slope-deflection
–Moment distribution
–Riveting and welding
–Bearing plates and grillage beams
–Bridges
–Mill Buildings
–Multi-story buildings
–Design of concrete mixtures
–Mixers and mixing
–Buildings and walls, footings and foundations
–Concrete arches
–Box culverts and rectangular frames
–Properties of soils
–Mechanics of soil resistance
–Caissons
–Underpinning
Sewerage and Sewage Disposal
–Intakes and dams
–Ground water
–Aqueducts and pipe lines
–Pumps and motors
–Quality of water
–Water purification

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(Continued from page 114)

as your own, will carry on a flight strips program which will be a credit to us all.

Flight Strips Specifications

The term runway should not be incorrectly used for a flight trip because a landing area for aircraft is more than just the ground space required for the runway, apron and other facilities, if any.

Runways should be not less than 150 ft. in width for military use. The runways should be not less than 3,000 ft. in length for the use of pursuit arcraft and not less than 4,000 ft. in length for the use of all other military aircraft. These lengths are at sea level and are therefore subject to corrections for elevation. A runway of 150-ft. width is intended for the landing of one airplane at a time. The area may be 800x8000-ft. where the terrain will permit.

The dimensions of approach to the landing area should provide a suitable angle of approach to the flight strip, extending in a cone shaped space from the approach end of the runway. This approach area should be kept free of encroachment by high buildings or other obstructions by adequate zoning regulations for the locality surrounding the flight strip, so as to permit approach from either end of the flight strip runway.

The characteristics of the surrounding terrain may be uneven but the runway itself must be smooth, with a grade of not more than 1 percent for the entire useable area. The surface for the runway, whether paved or sod, should have adequate bearing characteristics. The treatment of the soil may be by some form of stabilization, such as the use of heavy grass turf, with or without soil stabilization.

Runways shall be laid out, wherever possible, in the directions of the prevailing winds, as determined by official wind roses. Official wind rose summaries based on minimum periods of five years, 24 observations a day, are available in most cases or may be interpolated for sites located between Army air base stations where such wind roses have been made. Communication lines or public utility poles on the near side of the highway right-of-way, or at the end of a runway, should be moved or placed underground. Other such flight-hazards should be placed on the highway right-of-way farthest from the flight strip area.

Airplane Loadings

In the specifications originally prepared for flight strips the probable maximum loadings for military airplanes were estimated on the basis of a gross weight of 80 tons for the entire airplane which would mean 40 tons distributed on each of two wheels. The distance from center to center for the tires was stated as an average of 30 ft. In a letter which I recently received from Philip Shutler, director of the Vermont State Planning Board and a member of the Vermont Aeronautics Board, he inquired both as to the dimensions of the approach zone and the loads per square inch of tire surface to which flight strips may be expected to be

(Continued on page 118)

Ever Look Under An Airport?

Or an army camp, naval shore establishment or ordnance plant? If you could "lift the lid," you'd see miles and miles of trench that had to be excavated for sewer, water, central heating, drainage and power cables—the last two particularly essential at airports.

You'd see a network of trench that had to be dug ahead of the marching feet, before planes could take-off, and to prepare for ordnance production and shipbuilding. Typical are more than 12 miles of drainage trench for open and tight joint concrete pipe at an Eastern air base—9 miles of trench for central heating piping alone at a naval training station—11 miles of trench for sewer, water, gas and cable at an aircraft engine plant.

Hundreds of miles of trench dug without delay by fast, dependable "take-it-as-it-comes" Buckeyes. In the arid Southwest, in rocky New England, in Mid-Western gumbo and Western shale soils—wherever trenches must be dug.

Buckeye engineers didn't know so much was going to depend on these trenchers, as they kept improving them over the past years, but their ruggedness, speed and maneuverability certainly have shown up well in these critical times. It would take an army of men with shovels the "duration" to do the spectacular trenching that Buckeyes have done and are doing.

Whatever or wherever the trenching job, you can be sure one of the 18 models of Buckeye Wheel and Ladder Type Trenchers will dig it with maximum speed and economy and with minimum outlay for equipment and maintenance.

Fast, compact Model 410 saves manpower for Public Utilities Department of Kalamazoo, Mich., on water line extension.

Food wins wars, too! Model 48—one of the large wheel types—digs irrigation and drainage trench in the Imperial Valley to increase food production.

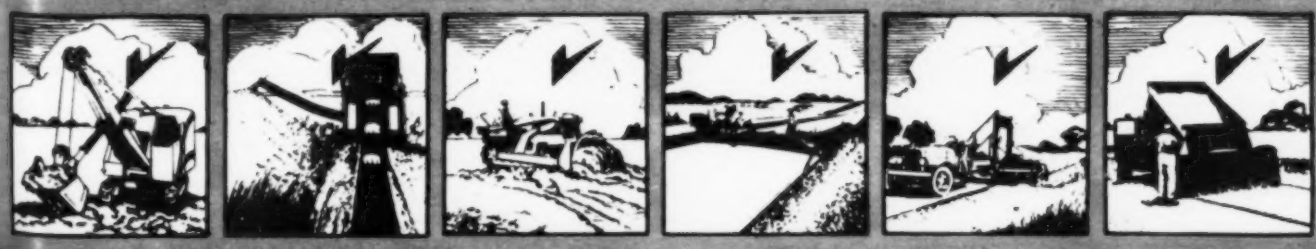
BUCKEYE TRACTION DITCHER CO.
FINDLAY, OHIO

Model 120 digs trench in a hurry for piers and footings, drainage, sewer and water at a mid-west ordnance plant.

Runway maintenance is cut by proper drainage. A Buckeye "160" speeds trenching at a training field.

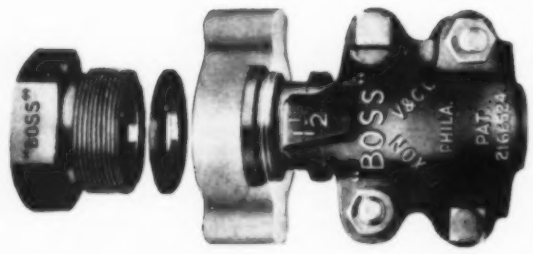
Built by Buckeye

CONVERTIBLE SHOVELS, TRENCHERS AND BACKFILLERS, TRACTOR EQUIPMENT, R-B FINEGRADERS, ROAD WIDENERS AND SPREADERS



CHECK PAGE 9

Designed to Guard STEAM, AIR and LIQUID HOSE LINES Against Failure!



"BOSS" WASHER TYPE Hose Coupling

STYLE W-16. Balanced design and rugged construction make this one of the most reliable female type hose couplings for virtually every kind of service. The powerful grip of the "BOSS" Offset Interlocking Clamp insures freedom from leaks and blowoffs; and the entire coupling is designed to protect and prolong the life of the hose.

Sizes: ¼" to 4", inclusive, with 4-bolt Clamp on sizes 1" and larger; 2-bolt Clamp on sizes under 1".

NOTE: For *washerless* female couplings, specify "GJ-BOSS" Ground Joint Hose Coupling, Style X-34.

"BOSS" Male Hose Coupling

STYLE MX-16. The companion coupling for both the "BOSS" Washer Type and "GJ-BOSS" Ground Joint Female Couplings. Thoroughly safe, dependable and economical for either high or low pressure service. Does not require oversize hose or hose with enlarged ends, and embodies the same efficient clamping principle as the "BOSS" and "GJ-BOSS" Female Couplings . . . features that give it preference over the ordinary iron pipe nipple. (Example: A 1-inch "BOSS" Male Coupling fits 1-inch I. D. hose and is equipped with "BOSS" Offset Interlocking Clamp; while a 1-inch iron pipe nipple must be fitted to 1¼-inch I. D. hose and held by regular band type clamps.)

DIXON Hose Couplings Are Available Through Your Hose Supplier or Equipment Distributor.

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(Continued from page 116)

subjected. Because these same questions may also have occurred to members of other state planning boards, highway departments or state departments of aeronautics, I shall take them up in order.

The dimension of the approach, in order that a sufficiently long and protected approach zone may be provided, should be taken care of in the original laying out of the flight strip area. At this time consideration should first be given to obstructions, both natural and artificial, outside the boundaries of the flight strip area. These include mountains, tall buildings, smoke stacks, radio towers, water tanks, and the like. Prolongations of the runway on the flight strip area and of the safe glide paths must clear all such obstructions. Secondly, consideration should be given to topography of the landing area in order to minimize cutting, filling and grading.

The safe glide path outside the flight strip area on the prolongation of the runway should be, wherever possible, within a trapezoidal area 2 mi. long extending beyond the boundary of the flight strip area, and in the direction of the center line of the runway prolonged. This trapezoidal area should be not less than 300 ft. wide at the boundary of the flight strip area, and 4,000 ft. wide at the far limit. Within this trapezoidal area no obstacle should be permitted of sufficient height to obstruct an angle of glide of 40 ft. horizontal to 1 ft. vertical. In some locations we will probably have to be satisfied with an approach area with a glide angle of 30 to 1. Certain types of lesser obstructions to an otherwise desirable approach, such as trees, power lines, and chimneys, may in some cases be removed or lowered. Within the flight strip area itself no obstruction or building should be permitted within 150 ft. of the center line of the runway.

At the present time the preliminary layout plans for each flight strip will normally be prepared in the office of the District Engineer of the Public Roads Administration charged with the construction of the project in question, in accordance with specifications made available to the Commissioner of Public Roads by the Army Air Forces.

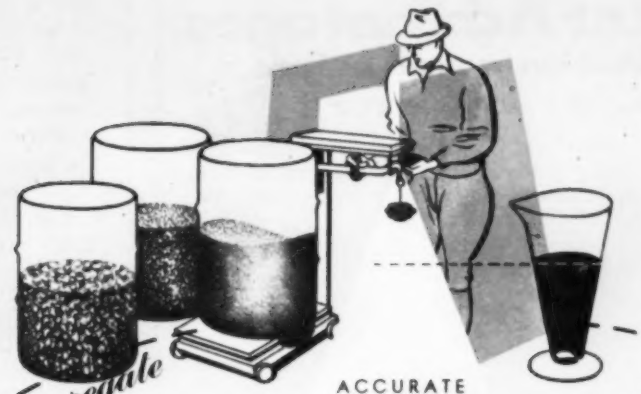
Tire Surface Load

In reply to Mr. Shutler's inquiry as to the load per square inch of tire surface in contact with the runway, the best recognized authorities on this subject believe that new heavy bombardment designs up to and including the Spring of 1944 will call for gross loads of 120,000 lb., static wheel loads of 60,000 lb., tire inflations of 70 lb., impact factors 25 percent, with a design stress requirement of 583 lb. per sq.in., and a minimum safety factor of 1.20. These design factors will allow from one to three landings per day, if necessary, of the Air Corps new standard heavy bombardment airplane as exemplified in the B-29 airplane.

Why Not Widen Highways?

A question frequently asked is: "Why

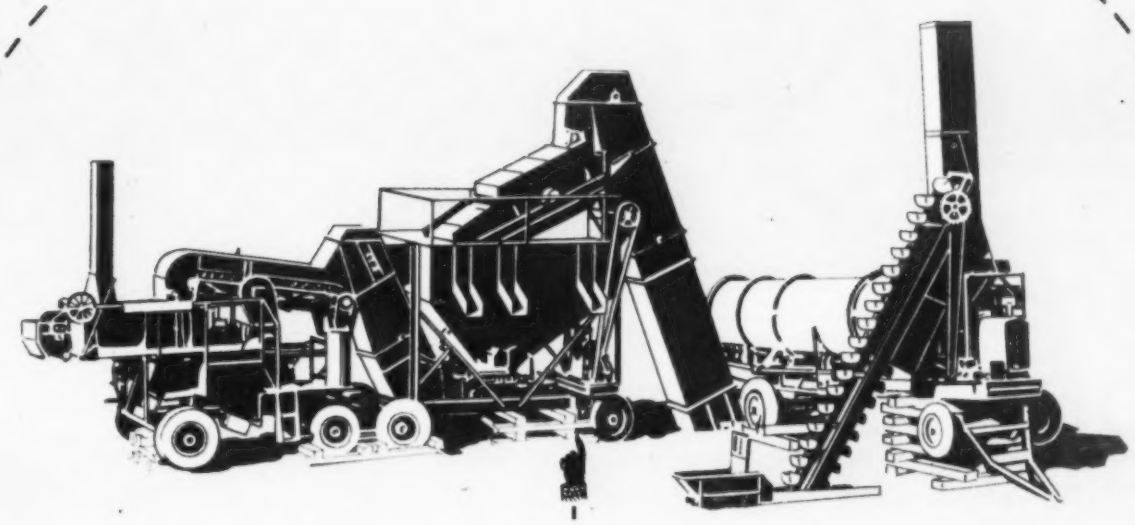
(Continued on page 120)



aggregate

bitumen

ACCURATE
CALIBRATION
BY WEIGHT



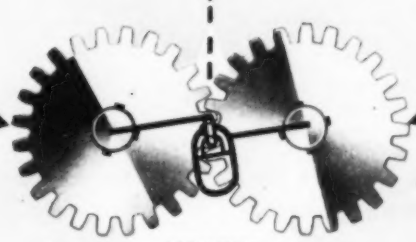
Only

WITH A BARBER-GREENE

Continuous Mixer

aggregate

bitumen



RESULTING
SETTING LOCKED
AND INTERLOCKED

The simple procedure illustrated above accounts for the untiring accuracy of the Barber-Greene. The desired quantity of each size aggregate is weighed, and the feeder gates locked at this setting. The bitumen metering pump is set for the desired ratio, and mechanically interlocked with the aggregate feeder. The Barber-Greene achieves POSITIVE PROPORTIONING in bituminous mixing. Feeding these accurately proportioned materials into the twin pugmill in a proportioned continuous stream, the Barber-Greene easily delivers a uniform mix, ton after ton—mile after mile. The Barber-Greene has set entirely new standards for short inexpensive moving and set-up time. Investigate this ingenious machine. Complete literature on request. Barber-Greene Company, Aurora, Illinois.

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BARBER-GREENE

15 New Boom Bucket Advantages

. . . a combination never before offered on any paver

Ransome 34-E Single and Dual Drum Pavers, equipped with the new Hydraulically controlled Boom Bucket, now give you these profit-increasing advantages . . .

- Eliminate split batches.
- Discharge small portions of concrete, close doors and move boom to other locations.
- Save time of bucket travel for split batches.
- Open or close doors to any degree at any position on the boom.

These are but four of fifteen reasons why you should investigate. For the complete story . . .

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Sterling WHEELBARROWS

(Continued from page 118)

not widen the highway itself, and use it as a landing area for planes?" General Arnold, Chief of the Army Air Forces, was asked that question when he testified in support of flight strips before the Senate Committee on Post Offices and Post Roads, in hearings held by that committee on the Defense Highway Act of 1941 on June 4, 1941. General Arnold pointed out that the highways themselves could not be used for landing aircraft, since this would stop traffic, and that landing on a highway, surrounded by ditches, public-utility poles or other obstructions would be a most hazardous undertaking.

In discussing planning and specifications for flight strips it is also appropriate to mention the basis upon which the numbers of flight strips to be developed will be determined. First, the number of flight strips will, of course, depend on the type of airplanes and the kind of terrain in which the Army Air Forces will operate. Second, the areas to be used for flight strips for the Army Air Forces will be determined by the nature of the anticipated attack and the location of the theatres of operation. Herr Hitler or Jingo Tojo may be factors in determining these locations, but for the Army Air Forces we hope that we will make that decision, and that it will be overseas. Third, in general terms, it will be advisable to have one flight strip for each squadron. A squadron consists of from 12 to 25 airplanes depending on the type of squadron. It will, however, be advisable to have one extra flight strip for every three squadrons; in other words, using technical terms, for every fighter, interceptor, or bombardment group in the Army Air Forces, four flight strips will be advisable.

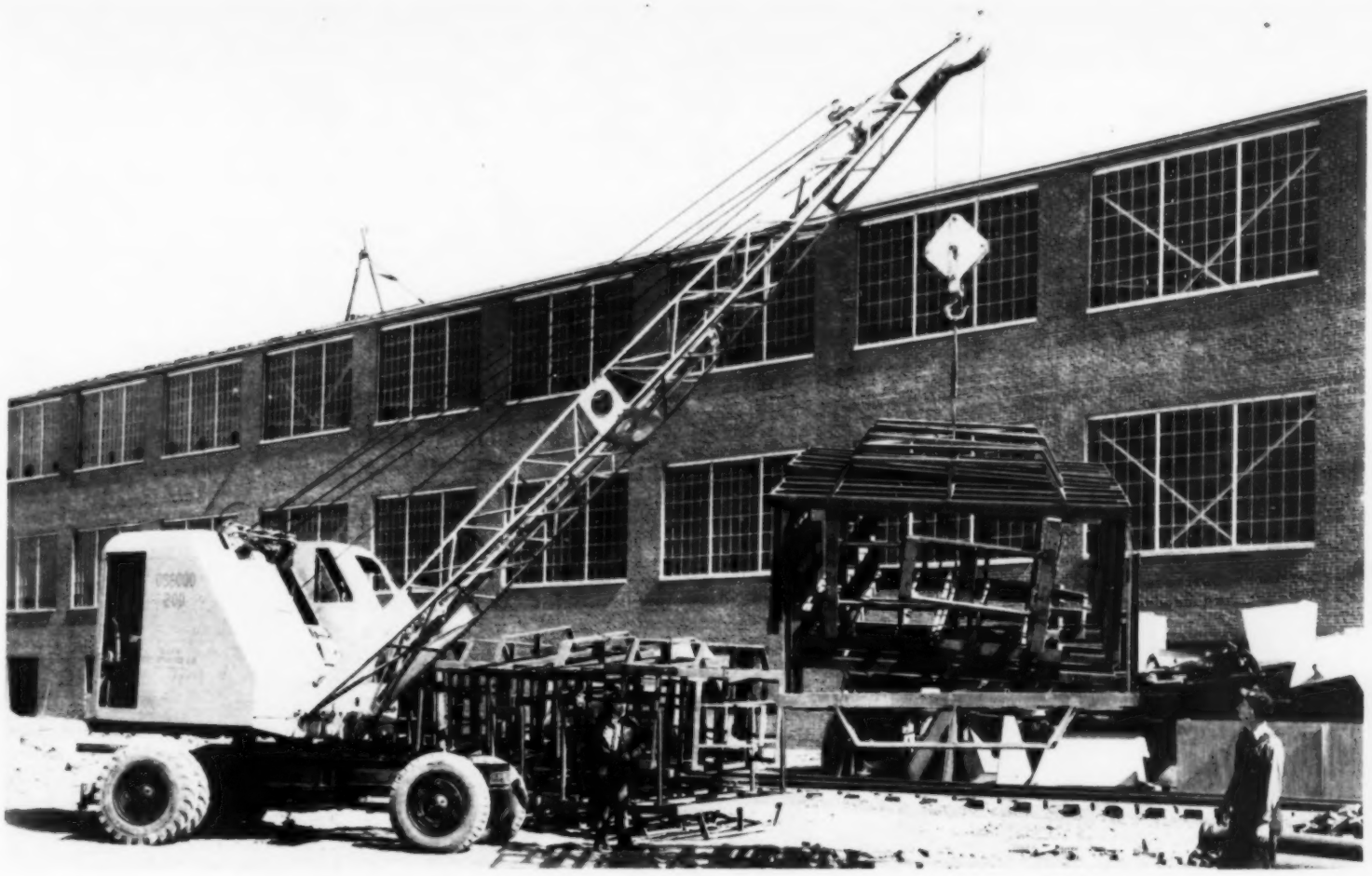
Let me add a word of caution. While we want to keep up a certain amount of competitive spirit and see which states do the best jobs, it is also important to remember that we are at war and that the exact location of the flight strips should be safeguarded.

Use of Flight Strips

From the military point of view, effective air defense of the United States demands that the flight strips program be conducted upon a nation-wide basis. Just as there must be organization in depth in order successfully to train pilots, build aircraft, or conduct a successful ground attack, so must there be organization in depth for the landing, take-off and servicing of aircraft. We must provide a network of landing areas strategically located in all parts of the United States. We must provide interceptor facilities all along our coasts. We must furnish dispersal points for aircraft, to alleviate the crowding of our main air bases and lessen the risk of large-scale bombing losses caused by excessive concentration of aircraft. And we must provide auxiliary landing areas to care for the vast increase in military air traffic which will soon take place.

The need which the Army Air Forces have for flight strips is not theoretical.

(Continued on page 122)



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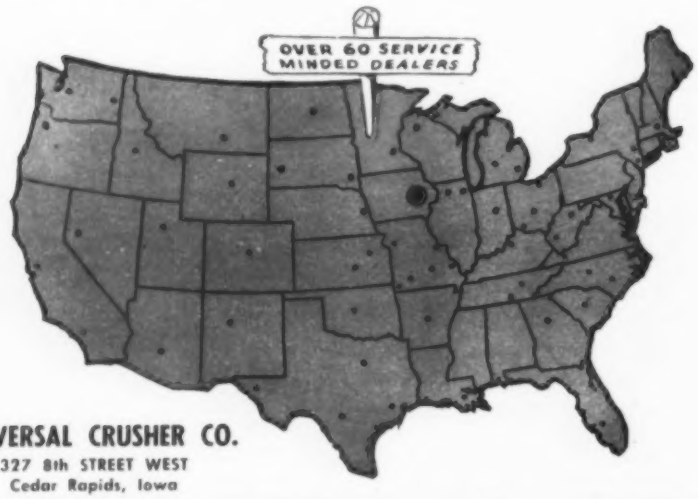

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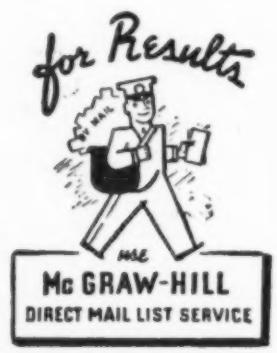

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(Continued from page 120)

but proved by experience. Col. Floyd E. Evans, formerly president, Airport Division, American Road Builders' Association, and recently Air Officer with the Headquarters of the Fifth Army Corps, had an excellent opportunity to observe the need for flight strips in actual military operations during the maneuvers held in the South last fall. Col. Evans wrote that hastily-constructed emergency fields were used with some success during those maneuvers for liaison and scouting work, but stated that these last-minute construction methods often resulted in dangerous delays. He pointed out that the cavalry and armored organizations insist on planes that move with them, and there must be planes to land close to the highways.

Flight strips will be no less important in the future of civil aviation. They will provide landing facilities for commercial feeder airlines connecting points not now served by airlines, and safe refuge for planes of all types forced down by weather or mechanical difficulties. They will, in addition, provide the ground facilities which will be essential for the tremendous increase in private flying upon which our expanded aircraft industry will inevitably depend for its existence after the war.

The flight strips program has been approved by the Congress and the President, and is being carried forward under eminently capable auspices. It rests upon a strong foundation. Now is the time for swift expansion of the program, if it is to meet the needs imposed upon it by war, and to achieve the results which America will demand of it in peace.

★ ★ ★

Prestressed Steel Bands

Reinforce Circular Concrete Reservoirs With Domed Roofs

(Continued from page 45)

ft. of earth was removed from the top of the hill to bring it down to a level with the site for the second tank. Excavation for the footings was made on good bearing ground, and the footings were poured annularly 4 ft. wide and 12 in. thick. The floor then was poured in concentric circles from the outside to the center. 7½ in. thick and with an outer edge of 15 in. All joints in the floor were depressed

(Continued on page 124)

7 ways to help you make equipment last longer...

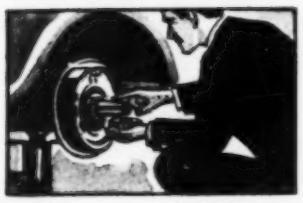
THIS SERVICE HELPS YOU TO

Locate high maintenance items by suggestions for accurate cost accounting records.

Promote longer ring and piston life by determining safe oil drain periods.

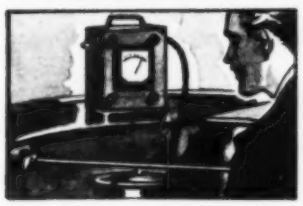
Lengthen valve and ignition system life by scientifically determining engine adjustments.

Reduce road failures by suggesting practical preventive maintenance methods.



Increase wheel bearing and transmission life by recommending lubricants and maintenance schedules.

Stretch tire mileage by analyzing and suggesting ways to correct causes of tire wear.



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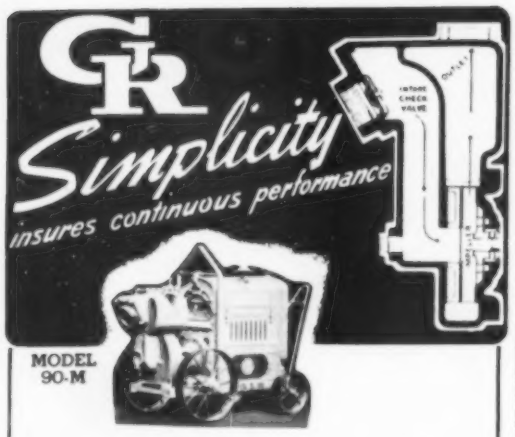

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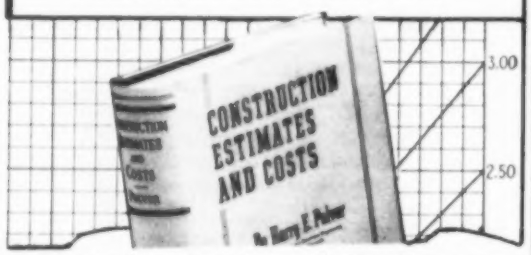

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Takes up each step of construction work separately – from first investigation to final, detailed estimates – and provides simple, arithmetical methods of accurately estimating costs. Covers estimating with both tables and diagrams and includes specimen tables and diagrams. Both diagrams and tables show variations in quantities as well as in prices of material and labor. Worked-out estimates for typical jobs show application of methods.

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(Continued from page 122)

and the space filled with mortar before the tank was placed in service.

Concrete Poured to Full Height

The inner 15-in. wall was poured to a full height of 30 ft. Three-tenths of the periphery was formed at one time, the forms being made of panels approximately 8 ft. square, constructed of 2x6-in. studs and ¾-in. sheathing, with the top and bottom plates cut to radius. The panels were held to line and plumb by wood frames bolted to the floor and extending up the full height of the wall forms.

In placing the concrete, one-tenth of the circumference was poured at one time, from the floor line to the top of the wall. The concrete was placed through holes 16 in. square, cut in the outer face of the form, in approximately 8-ft. lifts. The concrete was vibrated through these holes by a mechanical vibrator. After the pour was complete on three-tenths of the circumference, the panel forms were removed and placed in the next location around the circle. After three moves, sufficient panels were erected to complete closure of the remaining section of the wall and the final pour was made.

Prestressed Bands

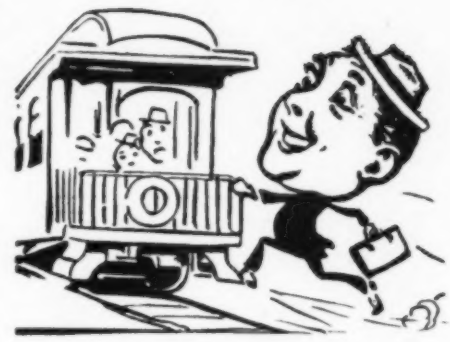
With hardening of this shell, 74 round steel bands, 1⅜ in. thick, consisting of ten rods each, connected by turnbuckles, were placed around the wall and prestressed by means of the turnbuckles. The spacing of these bands varied from 3 in., c. to c., at the bottom, to 12 in. at the top. The 4½ in. of concrete outer wall provide full bearing for the round bands.

Forms for the 4½-in. outer section of wall covering the steel bands were 4x15 ft., made of 2x4-in. studs and ¾-in. sheathing, lined with ⅜-in. wood panels glued to the sheathing. The concrete was poured in lifts of 3 ft. 10 in., the forms being moved up as the work progressed. Eighteen vertical spaces were left when the outer thickness was placed, and pilasters were poured in these openings from below the ground line to a point slightly above the top of the dome ring. They break the severe line of the dome ring and give a more pleasing appearance.

Dome Construction

In constructing the dome, the framing was supported on 111 wood posts, consisting of three 2x6s nailed together to form an H. These posts were topped with double 2x10-in. girders. The joists were cut to radius and assembled on the ground, with struts under the joints, wedged up on the girders when erected. A dome ring bearing directly on top of the wall, separated by an asphalt joint, was placed in one pour, extending approximately 8 in. in on the dome curve, where a construction joint was made. Before pouring the dome, nine steel bands were prestressed around the dome ring. The dome itself was poured in three sections, concentrically, the outer section being poured first. A small hole was left next to the dome ring wall, through which the form lumber was passed after stripping, and which will serve as an

Moving?



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entrance, with a steel ladder leading to the floor.

All forms used in construction of the first tank were so fabricated and numbered that they could readily be assembled for building the second tank. Before the tank was placed in operation, all floor joints and vertical wall joints were filled with mortar, and the entire water-contact surface was given several coats of metallic waterproofing. The vertical design of the walls has enabled them to withstand the static pressure of 30 ft. of water without leakage.

Personnel

This reservoir was designed by William S. Hewett and constructed by the WPA. General foreman for the WPA was R. P. Tellander. The construction was under the direction of F. B. Jensen, superintendent of the Council Bluffs Water Works.

★ ★ ★

83-Mile Pipe Line

Completed in 60 Days

(Continued from page 69)

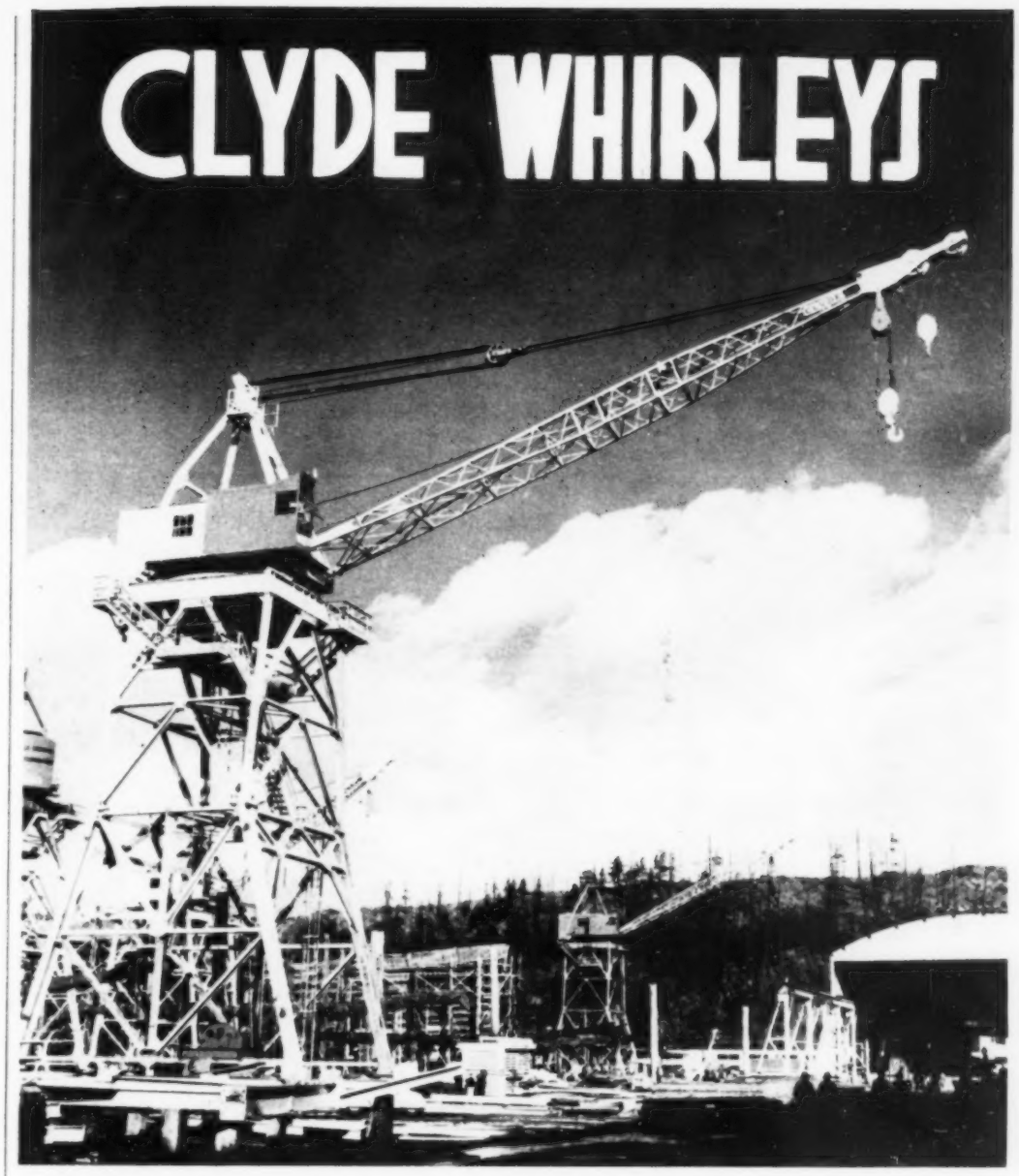
was laid in trench of a minimum depth of 2 ft. and backfilled. All bends were made with a minimum radius of 8 ft. to permit free passage of pipe-line scrapers to clear the line of any obstructions prior to placing it in service.

As summarized by Alex Robertson, president and general manager of the Macco-Robertson Co., the equipment inventory for the project included:

17 Side-boom tractors
14 Right-of-way tractors and backfillers
9 Wheel-type trenching machines
4 Truck-cranes
39 Electric welders
19 Pickups
4 Air compressors
3 Earth boring machines
2 Motor patrol graders
17 Motor trucks

For practically every field operation involved in laying the 83-mi. line, mechanical equipment was employed. Tractor-bulldozers cleared the right-of-way, Cleveland trenching machines excavated the ditch in which the pipe was laid, a special machine applied the asphaltic coating to the exterior of the pipe and a fleet of trucks hauled the pipe to the right-of-way. Where pipe delivery involved particularly rough terrain and grades too steep for the trucks, the contractor rigged special pipe-carrying platforms on large tractors for this special service. These rigs each transported four pipe lengths weighing 5 tons. The platforms were designed for raising and low-

(Continued on page 126)



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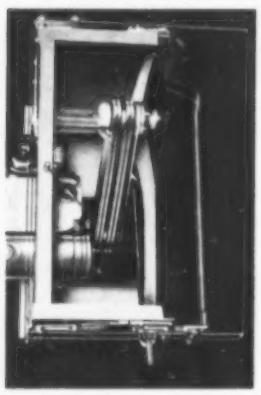

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(Continued from page 125)

ering by winches to facilitate the loading and unloading of the pipe. The pipe was lined up for welding by side-boom tractors, jointed with the aid of electric welders, lowered into the trench by the side-boom rigs and backfilled by tractor blades and bulldozers.

At 54 points the line crosses highways and railroads. Here mechanical earth-boring augers were employed to excavate horizontal passages for 16-in. casing through which the 10¾-in. oil pipe line was extended. At two river crossings the line was carried in dredged trenches from 7 to 24 ft. deep below the streambeds.

Welded Joints

Joints in the pipe line were welded in three beads by the shielded-arc process, using equipment that included six of the Lincoln Electric Co.'s new diesel-powered welding machines. More than 10,000 welded connections were made in the line, which withstood without leakage a hydrostatic test pressure of 1,200 lb. per sq. in. With the aid of side-boom tractors, the pine was cold-bent to conform to vertical curves in the line. Horizontal curves were made by bending in the field and, at the sharper curves, with sections of pipe shop-bent to a radius of 8 ft.

Personnel

The operations of the Macco-Robertson Co., were directed by Alex Robertson and John MacLeod, with Les Pratt and Jake Case as superintendents. B. M. Laulhere, Jr., was project engineer and Bill Snider office manager. The foreman in charge of the seven crews operating at different points of the 83-mi. line were: Sam Rook, Cliff Taber, Dolph Lowe, Fred Lowe, Ed. Snitzler, Carl Hassler and Joe Morgan.

★ ★ ★

Construction Details

AT CAMP COOKE

(Continued from page 65)

An outstanding novelty in this camp are the "wind trusses" which use 1⅜-in. Douglas fir plywood gussets in place of the Army's standard knee-braces. The curved piece of waste remaining after cutting the gussets is utilized at the peak of the truss, as shown in an illustration. The gussets are stagger-spiked between the two members of the double 2x8-in. columns in the sidewalls and are side-spiked to the top cords, using 20d. spikes. The 2x6-in. raised collar beam is bolted to the top members without ring connectors.

A cost analysis made when these buildings were in the design stage showed that

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use of this type of truss on 9-ft. centers, with intermediate collar-tied rafters on spacings of not more than 2 ft., produced a stiffer structure at a cost no greater than for the old knee-braced roof. The width of these buildings is 25 ft. 4 in.

Maintaining Roads and Parking Areas

In the early days of construction at this camp, it was necessary to maintain 4 mi. of road and two large parking areas before enough water was available to supply sprinkler trucks. Hence, provision was made for using sea water pumped up from the beach nearby. No difference was noted, so far as keeping down dust is concerned, between fresh and sea water. Three to five sprinkler trucks worked two 8-hr. shifts daily with tank capacities of 1,600 to 2,000 gal. The pump unit that supplied these trucks was a four-cylinder gasoline-driven Waukesha motor with centrifugal pump of 4-in. intake.

Track Construction

Some 16 mi. of railroad track is required on the camp reservation connecting with the Southern Pacific Railway to whose track standards the camp railway lines were built. Maximum grade is 1 percent, compensated for curvature. The warehouse area is laid out for maximum operating efficiency with sidings, spurs, makeup tracks, and a loop for turning trains. The rails on gasoline spur tracks are grounded as a protection against sparks. The track was first laid on the subgrade and lightly spiked; ballast then was dumped and spread and the track raised to grade and aligned. Both Chicago Pneumatic Tool Co. and Ingersoll-Rand tools were used in finishing the track.

Rafter Seat Plates

Construction of wood-frame buildings was speeded and the time and labor required in preparing rafters was materially reduced by the use of metal plates for anchoring the rafters to their supports. These plates were used in lieu of the usual notching into the rafter itself and then toenailing—and sometimes splitting—the section weakened by the notch. Thus a uniform bearing is obtained, the member can be assembled by unskilled labor and, if any framing errors occur, they can be easily corrected.

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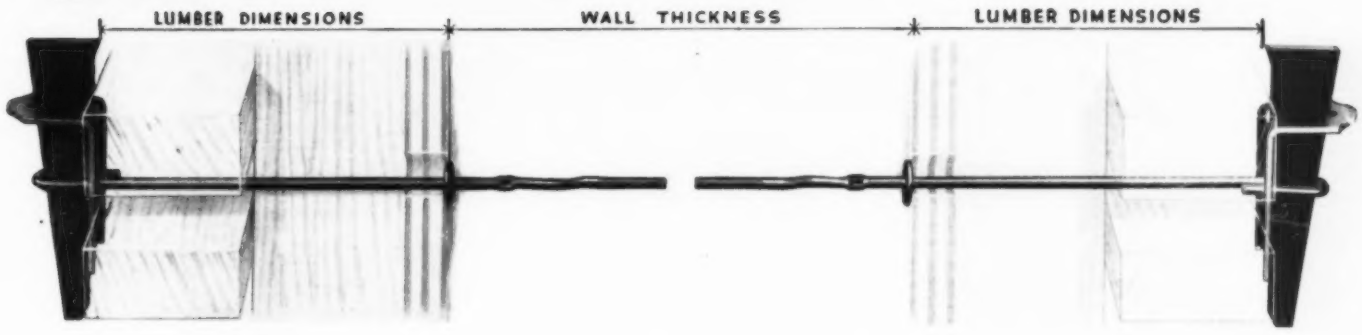

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